FARMING IN INDIA,

CONSIDERED AS A PURSUIT

FOR EUROPEAN SETTLERS

OF A SUPERIOR CLASS

WITH PLANS FOR THE CONSTRUCTION OF DAMS, TANKS, WEIRS, AND SLUICES.

BY

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by whatever agency, if the bank has been so constructed as to afford it nothing but support, the water must get to the crack; which, under pressure of any considerable head of water, would enlarge with frightful rapidity.

The proportions of the Bradfield dam, viz.: slopes $2\frac{1}{2}$ to 1, would have been adequate had the material and construction been good; but if, as appears to have been the case, the top of it was only six feet above full surface level, this was quite insufficient for such a depth and such a spread of water.

In the second place, the iron pipes under the embankment, appear to have been a mistake altogether. Their capacity was inadequate to give any effectual relief to the reservoir; the way they were laid was unsuited to secure them from displacement by the superincumbent and *irregular* pressure; and they had apparently neither collars nor head-walls to prevent the water from creeping along their outer surfaces. These pipes may not have been the actual cause of the breach, but they were plainly elements of danger.

Thirdly, it appears to have been supposed that "the business of an engineer" was limited to "making his embankment sufficient to resist pressure," and did not include the duty of "providing any other means of letting off the water, on the suppositon that the embankment was not strong enough;" certainly no adequate

means had been adopted, either by under-sluices or syphons, to provide for the prompt discharge of water in case of danger.

Now let us consider the conditions that would have been presented by an embankment constructed on the Indian model.

The embankment would have been higher above full water-mark—say fifteen feet for such depth—and probably wider at the base; and it would have been virtually a homogeneous mass. The "stone and shale" would have been rejected, or kept for facing; the earth would have been thoroughly well watered, and rammed foot by foot during the process of construction; the *whole* being made as [illegible] and water-tight as possible.

There would, generally speaking, have been no puddle-wall; but if, owing to the nature of the soil, puddling was necessary, the inner face (that towards the water,) would have been puddled under the stone revetment; which latter would have been carried up at least six feet above the full surface level, as a protection from the wash of waves.

If any portion of the bank rested on a smooth face of rock, either level, or sloping down from the reservoir, a masonry footing, or retaining wall, of adequate dimensions, and with vent-holes to admit of draining off any water percolating through the outer slope, would have

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INTRODUCTION.

WHEN a subject of some importance is so obscured by misconceptions and defective knowledge, that the full extent of its importance is unappreciated by those most interested in knowing it, any attempt to throw a little more light upon the subject may prove found acceptable and useful. I have, therefore, been induced to submit to the public the following pages.

On my return to England I was much struck with the want of accurate information on the subject of India, especially considered as a field for the enterprise of European settlers of the better class, even among those who were desirous of providing means of profitable employment for some of those numerous scions for whom eligible openings at home were not too plentiful.

On suggesting India as a possible field for enterprise, the objections raised usually showed that the subject was not really understood; that it was obscured by prejudices and erroneous notions, which, except in the

case of those who had personal friends of Indian experience, there was no information extant to correct. A book, therefore, briefly and plainly communicating facts upon such points of Indian living and Indian farming as an intending settler should thoroughly understand before making up his mind, appeared to be a desideratum.

What these points should be, beyond mere tables of rates and notices of agricultural produce, was indicated partly by the questions put by persons with whom I have conversed on the matter; but chiefly by my own observation, while in India, of the expense, trouble, imposition, and disappointment to which Europeans have been subjected for want of a little knowledge of some of the subjects discussed in these pages.

This must be my apology, if any be thought needful, for the minute details I have given as to the construction of buildings, reservoirs, irrigation and drainage works,—all matters of vital importance to the Indian farmer, and which, in ninety-nine cases out of a hundred, he will have to see to himself.

The lamentable catastrophe at Sheffield, which occurred while these sheets were passing through the press, may, perhaps, give additional interest to the descriptions of Indian reservoirs and embankments, which will be found in the chapter on Irrigation and Drainage. A com-

parison naturally presents itself between the dam of the Bradfield Reservoir, which failed, and the Indian model which has been so long and in so many instances successful; and which, if rightly constructed and faithfully attended to, may be regarded as ensuring the maximum of efficiency and safety.

Empirical as the process may appear, practice *has* made it perfect. Engaged in a continual struggle with the powers of nature—contending with volumes of water far larger, floods far heavier, tempests more violent, than any known in England—the Indian engineers have been forced into devising means, not only to enable a bank to stand a given pressure of water, but also to provide resources against contingent risks and accidents; which latter provision, strange to say, appears, from the evidence on the inquest at Sheffield, not invariably to be considered a part of the engineer's duty in this country.

Yet efficiency and safety combined should unquestionably be the first consideration in all undertakings involving the security of an immense amount of property, and what is far more important, the safety of human lives; and we have been so terribly shown that reservoirs of water come under this category, that I trust I may be excused for extending these remarks in order to point out what appear to have been the errors in the construc-

tion of the Bradfield dam, and the reasons why an embankment on the improved Indian model would, in all probability, have been safer.

In the first place, the construction of the Bradfield dam appears to have been erroneous in principle, from the fact of the puddle-wall having been regarded as the "real security," the only object of the bank being "to support the puddle-wall, not itself to keep out water."

Consistently with this idea, the bank appears to have been a mere heterogeneous mass of "stone, clay, shale, and earth," thrown together without proper consolidation: indeed, it was characterized by an eminent authority as being "porous as a sieve."

The puddle-wall is described to have been 95 feet high where highest, exclusive of the foundation in the puddle trench; and 4 feet wide at the top, increasing in thickness at the rate of an inch and a half per foot in depth, which would give $15' \, 10\frac{1}{2}''$ breadth at base; say 16 feet, the mean thickness being $\frac{2}{19}$ths of the height.

Such a wall would certainly require a good deal of "support" from the bank; but supposing this bank, composed of "material of the openest possible character," were to slip a little, or subside a little, irregularly, on one side or the other, an unequal pressure would immediately bear upon the puddle-wall, which must crack as a matter of course. Such a puddle-wall once cracked,

been benched into the said rock to serve as a support against slipping.

A site in which copious springs started from the rock, would have been avoided if possible, and the springs included *in* the reservoir. Or if it was absolutely necessary to construct the embankment over such spring or springs, it or they would have been tunnelled over, and led off to the tail of the outer slope, if merely local and of small amount; or, if connected with the reservoir, and so likely to discharge violently as the water rose, and by finding vent behind the bank, to become a constant, and perhaps increasing drain on the supply, they might have been set in a well or tower of masonry in the embankment, in which the water might rise to the tank surface level, and counterpoise the pressure.

Means would have been devised to provide for the escape of surplus water by a bye-wash, or calingala, of adequate length, and also for drawing off the contents of the reservoir ad libitum by syphons, by under-sluices or culverts in the hill-side, and by submerged vents, called Tambogies, in the waste weir.

If it had been necessary to pass any water under or through the embankment, the pipes, if used, would have been laid in massive masonry culverts, deep founded and well protected by head and wing walls; and arrangements would have been made for closing

such pipes at their heads, *i.e.*, at the end *in* the reservoir, when needful.

Such pipes and culverts would, however, be preferably avoided with such great heads of water; the pressure being so enormous: for example, with a head of eighty feet, the velocity of the stream rushing through such a pipe would be about forty-eight miles an hour!

Vents at different levels can always be arranged with perfect safety to the work, and are always to be preferred.

The *possible* causes of the breach in the Bradfield dam are stated by Mr. Rawlinson, as follows:—

Fracture of the pipes.

Blown or drawn joints of pipes.

Creeping of water along the pipes.

A pressing down of the pipes in the puddle-trench by the heavy material.

A washing away of the outer slope.

A landslip caused by *undiscovered* fissures and springs in communication with the water in the reservoir.

And, I will venture to add, a partial subsidence of the loose earth of the embankment, and a consequent fissure in the puddle-wall.

Now it will, I think, be apparent, that with the Indian model of embankment above described, the

first four possible causes of breach would not have existed.

The fifth, the washing away of the outer slope, would have been less likely to occur, owing to the greater density of the bank; and had it occurred, would have been much more gradual, and so have afforded time for remedial measures: which, with the Indian system of escapes, could have been applied at once.

Even supposing a *perfectly unexpected* landslip to occur—the geological formation of the site having given no reason to anticipate such, and therefore, no additional safeguards having been adopted in the way of retaining walls—still, unless it were a very sudden and very extensive slip, the massiveness and homogeneous character of the bank would so far retard the process of destruction that, if the escapes were opened as soon as the first signs of settlement were observed, not only might the ruinous effects of a breach with a full reservoir be avoided, but the work itself might be saved.

This is not a mere hypothesis; for I could name instances in which such slips have occurred, and the works *were* saved in the manner described; and, though in these instances, the depth of water was considerably less than in the Bradfield Reservoir, still, as the ratio of resistance to pressure was certainly not

greater, but probably much less than it would have been made in a larger work, similar results may be admitted as likely to take place in both cases.

For, with one solitary exception, the principles of construction are precisely the same in the very largest reservoirs as in the smaller tanks (described in the chapter on Irrigation), which are within the means of individual farmers to execute: the one exception being that, where the depth is very great, it is unsafe to pass water beneath the embankment under the pressure of the full head, whereas with moderate depths such a practice is unobjectionable.

T. G.

CLIFTON, *March* 26, 1864.

FARMING IN INDIA.

CHAPTER I.

THE LAND AND CLIMATE OF INDIA.

It will hardly be disputed that our vast territorial possessions in India have not yet taken the place to which they are entitled by their extent and fertility, in the general system of our Colonial empire; and for this there have been political, as well as other reasons, which it is no part of my purpose to discuss: indeed most of them have already been numbered with the things of the past.

The self-evident facts by which I am most deeply impressed are these: England possesses available capital to any amount, and her sons are not deficient in the energy necessary for any enterprise that promises a reasonable hope of success. Nevertheless, an immense number of educated young men find it extremely difficult to employ their time profitably, even with reasonable means at their

command. The mere interest on investments is low in comparison with the expenses of living, and small capitals can only be embarked in trade at considerable hazard. In India, on the contrary, there is an almost unlimited field for enterprise, whether on a large or a small scale; the necessary expenses are moderate, and the returns for capital, as will be shown, are at least fairly remunerative. The soil for the most part is of exuberant fertility if watered, and an ample supply of water can be commanded if rational precautions be taken to secure it. The supply of labour at reasonable rates is also abundant, and the country affords ample room for the enterprising, and will continue to do so for many years to come. The improvement of the Indian revenue has proved, by the inexorable logic of facts, that the resources of the country were far indeed from being developed; and it is no longer regarded as a dream of enthusiasm to anticipate that (supposing the blessing of peace continue to be vouchsafed,) the revenues of India may be doubled in the next twenty years, and the wealth of its people multiplied tenfold in the same period.

Of late years much has been done by the Government to improve the position of English settlers in India, and there is no reason whatever why they should not enjoy a considerable share of the future prosperity of the country. It must be remembered, however, that India is not an unreclaimed country, infested rather than inhabited by nomadic tribes of barbarians. For several thousand years, it has been fairly possessed as a whole, by a race enjoying a considerable, though

peculiar civilization, thoroughly capable of appreciating their rights, and of turning their opportunities to account, though not always in the best manner. Such a people can only be dealt with in the same manner in which Englishmen deal with one another. Their vested rights must be respected, and their equality in all matters of bargain and sale fully admitted.

It is true there is in India a good deal of waste land, not only unemployed, but having neither proprietor nor claimant to interfere with the intending occupant. The difficulty is to be certain in any given instance that this is really the case. Much of the land which might seem to be so circumstanced has claims upon it of which no one hears until interference is threatened. Then it comes out that certain parties have ancient and indisputable rights over it; sometimes as grazing, sometimes as Rumna or hunting grounds; sometimes a right of cutting jungle, or sometimes a right exists to keep a certain tract desolate as devoted to some god or fiend. Sometimes in the heart of a wilderness traces of ancient cultivation may be found. Famine, war, disease, may have thinned the population, so that the fields have been unused for ages, but as long as a single individual survives in whom an hereditary right may be vested (and in no part of the world is the memory of such rights better preserved than in India), so long will the deserted fields be considered a part of the family property, and any attempt by an outsider to take possession of them be resented as a wrong.

It has, therefore, been wisely provided by the British

Government that previous to the final sale, or allotment, of any land supposed waste, due and sufficient notice shall be given, in order that any native who asserts the possession of a prior title may have an opportunity to make good his claim. The danger of subsequent litigation or ill-will is thus avoided, and although there is no such thing as an unlimited right of squatting in India, land may be held there under as secure a tenure as in England.

After the land, the climate is of chief consideration. In Southern India—speaking generally of the plain country—it is unpleasantly hot during four months of the year, unpleasantly wet during other four months, but by no means disagreeable for the remaining four. The extreme heat is less than in Hindostan Proper, or the North-Western Provinces; and the hot and wet seasons may be pronounced—still speaking generally—more unpleasant than unhealthy. The class that suffers most in India are the rank and file of European regiments; they have against them, close quarters, great temptation and, unfortunately, great inclination to drink, monotonous duties, few amusements, and by far too much leisure. Under these circumstances, the average mortality amongst them may be roughly estimated at three per cent. per annum, while three-fourths of the cases in the hospitals for Europeans may be safely referred to diseases for which the climate is in no degree accountable.

As a further proof of what is here stated, it is a remarkable fact that the officers and subordinates of

the Department of Public Works, who are *continually* exposed to the weather, and have to endure much fatigue, constantly moving about in swamps and jungles, with very imperfect shelter, and very few luxuries or even comforts to support them, are, as a body, very healthy. Sportsmen, planters, and their overseers, in short, most men who lead an active out-of-door life and are moderately temperate (teetotalism does not answer), also enjoy good health, and, setting aside accidents, appear to have as good a chance of life, and of enjoying a vigorous old age, as the average of the middle classes in England. Those among the gentry whom I have observed to suffer most from the "climate," have been men of sedentary lives; addicted to too much good-living, and too many "cooling drinks;" people who go about in closed carriages in the daytime, eat meat breakfasts at 10 A.M., meat tiffins, with beer, at 2 P.M., and a dinner at 7 or 8; who carry on their work in arm-chairs under a punkah, carefully avoid all exposure to the sun, and only take exercise, if at all, by twilight. These are the victims of dyspepsia, of liver complaints, and nervous depression. These are they who bring home to England the conventional sallow countenance and shaky frame considered characteristic of the old nabob. Ladies also, who, as a rule, take much less air and exercise than they ought, and accordingly they suffer more from "climate" than men who are actively employed out of doors.

The climate of Southern India varies greatly, both with regard to localities and to change of season. The

lower spurs of the hills are always unhealthy, and at certain seasons of the year are often uninhabitable on account of fever. Densely wooded tracts are also very objectionable. The low swampy ground near the mouths of rivers is bad as long as it remains in its natural state, but when embanked, drained, and cultivated, appears to be as salubrious as the upland plains. Thus the swampy tracts of the Godavery and Kistna deltas, which used formerly to be favoured haunts of fever and ague, have been marvellously improved in healthfulness by the recent embankments and drainages. The marsh fever is now almost unknown among people who take ordinary care of themselves.

The wide-spread plains of dry land lying parallel to the coast, and the exposed and wind-swept table-land of Mysore, are *naturally* the healthiest parts of the peninsula.

The western coast is too damp and too luxuriant in spontaneous vegetation to suit the majority of European constitutions, though instances are by no means wanting of Englishmen living there to a good old age in the full enjoyment of health and vigour. I could name men in Travancore who, after forty years' residence, are hale and hearty still. The summits of the western ghauts, including all table-land above what is called fever-level, are, however, as a general rule, healthy enough for all except persons affected with chronic diseases of the liver, lungs, or heart. During the hottest season of the year the nights and mornings are always cool in these localities, and though the mid-day sun is fierce, there is

none of that hot wind, which comes like the breath of a furnace during the months of April and May, and parches up the plains of the Carnatic. The rainy season on these lofty lands is not unhealthy, and during the season immediately following the rains (the pleasantest of all to the sensations, but the most dangerous in most parts), these high grounds enjoy the benefit of strong breezes, which are supposed to sweep away any malaria as fast as it collects. High lands that are in any way screened from the action of these winds are far more feverish than sites on the same level which are more exposed, and this is doubtless the reason why the so-called fever range varies so much on different parts of the Hills.

With regard to the seasons, the hot and the wet are the healthiest. The changes are always trying, and the cold weather, immediately after the rains, the most unhealthy, wherever there is much spontaneous vegetation. The latter part of the cold season, on the contrary, in January and February, is both healthy and delightful. It is during the height of the rainy season that the forests and lower spurs of the hills are least dangerous, being swept clean of malaria by the prevailing torrents.

The best precautions against the dangers of the Indian climate are as follows, and they will be found suitable to all localities :—Have your estate well drained, and do not allow vegetable refuse to accumulate. If you can possibly manage it, eschew small ponds ; water, of course, you *must* have ; but one large tank is pre-

ferable in point of economy, and far less unwholesome, than several smaller ones. Channel irrigation, with the water always flowing, is best of all, if it can possibly be accomplished.

It is well to have your bedrooms on an upper story, or, at any rate, raised five or six feet above the level of the site. Bear in mind that malaria always lies low. Trees, near a house, are objectionable, and so is a dense grove or forest at any distance that intercepts the free current of the wind.

Have fires in your rooms occasionally, both during and immediately after the wet season. They will not be needed for warmth, but are indispensable for dryness, and will benefit your furniture and property, as well as your health. Earthen pans, with charcoal, are generally used, but a small portable stove would be a great improvement on these methods.

Screen your head and the nape of your neck from the direct rays of the sun. A soft felt hat, with a common muslin turban wound round the crown, the ends hanging down behind, is as good a protection as need be wished.

If you chance to get wet through, no harm will arise as long as you keep in motion, but change everything directly you get home. If by any chance you should be obliged to sleep in your wet clothes, wrap yourself tightly up in as many blankets or cloaks as you can obtain (as in the cold-water cure), you may then go to sleep in a wet trench, or in a boat half full of water, without risk. *Experto crede Roberto.*

If obliged to sleep in the jungle, or among the lower spurs of the hills during the fever season, cover yourself well up, and use musquito curtains, or if you do not possess these, or no bedstead on which to hang them, wrap up your head loosely in two or three folds of gauze, and if, on awaking, you feel "queer," shivery, your legs aching, your head heavy, as in the first stage of influenza, take, without delay, a strong dose of quinine, and "make tracks" as fast as you can, for these are the premonitory symptoms of jungle fever.

It is almost superfluous in the present day to recommend temperance and sobriety, but caution may be needed against too much abstemiousness, as being but little less injurious than excess. The old argument in favour of abstemious living in India, deduced from the supposed example of the natives, is fallacious in two ways.

The natives are by no means abstemious; those who can afford it eat much more *in bulk* than we do: a native will sit down to a plate of rice or chuppatties (unleavened bread) which two Englishmen could hardly dispose of. Those castes that do not eat meat make up for it by their consumption of ghee (clarified butter) and sugar. The natives who can afford to live the best, that is, *eat the most*, are by far the finest men. And a very great improvement in the physique of the labouring classes in the improved districts has been observed since constant employment and good wages have enabled them to live better, that is, *eat more*, than their fore-

fathers. The native, then, is only abstemious by compulsion, and when he is forced to be so, it is so much the worse for him.

There is, in fact, an enormous expenditure of the material of the human frame constantly going on in a tropical climate, and an equivalent supply of pabulum is absolutely necessary. Stimulants in moderation are also, I believe, beneficial. At least, as far as my own observation goes, men who have made moderate use of beer, wine, and spirits, have enjoyed better and more permanent health and strength than those who have totally abstained. The question must be decided by each man for himself, according to his own constitution. One rule, however, is of universal application, and that is, if you *do* take strong liquor of any kind, take it in small quantities, and of the best quality.

CHAPTER II.

CHARACTER OF THE NATIVES.

The natives of India would be something more than human if a certain amount of opposition had not to be encountered by an interloper; but I shall proceed to show that this is not greater than might reasonably be expected. Questions of right I do not here take into consideration, because common justice requires that a native should have every facility for raising an objection on the score of his title to the land. As long as English landlords consider themselves justified in protecting their estates from a process of indiscriminate squatting, it is highly probable that the natives of India will be influenced by the same feeling. There are, however, motives of opposition less justifiable, which I propose to pass briefly in review.

Native farmers sometimes object to any more land being taken up for cultivation, whether by Europeans or by other natives, under the idea that the value of their own crops will thereby be diminished. They have the same dread of "over-production" that not long ago influenced certain members of the Civil Services to

oppose works of irrigation on a large scale. The progress of enlightenment will eventually remove this somewhat selfish objection. Meanwhile, it would not be admitted by Government as a valid reason for opposition; the fact being now recognized, that where means of transport exist, over-production is, in the present condition of mankind, an impossibility.

There has been, doubtless, and is still to some extent, an objection in the hearts of the natives to the introduction amongst them of English farmers. They instinctively dread the greater energy and superior means of the European, feeling no confidence in their own ability to vie with him. They fear the disturbance of their own stereotyped forms of procedure: they are afraid of personal violence from the overseers and other European subordinates, and sometimes they have a not unreasonable fear of the light that may be let in upon dark places. To explain this, it may suffice to remark that, in almost every part of the country previous to the revenue survey now in progress, the actual holdings of the native farmers were considerably in excess of the nominal holdings for which they paid rent. In one batch of seven villages in the Godavery district, the excess of land actually under wet cultivation over the nominal return of such land on the collectors' books was found on survey to be no less than $128\frac{1}{2}$ per cent.! The farmers know that the sharp eyes of their European neighbours would soon discover these things.

Again, in another district in a remote part of the Travancore country, the inhabitants opposed the making

a road, because it would facilitate honest traffic and the visits of officials, and so endanger a profitable system of smuggling which they had enjoyed from time immemorial.

The revenue survey will abolish much of this opposition by depriving it of its object. Just and humane behaviour on the part of the English settlers will conciliate personal good-will, and time and experience will do the rest. The native farmers will find out, as they have already in many places, that the European settler introduces cash as well as competition; that wherever he appears the means of transport are improved and new markets opened; that though his presence raises wages, it also raises prices and increases consumption; that drainage, cleanliness, education, and organized charity, follow in his train; and that they themselves cannot help sharing, to some extent, in his prosperity.

It is not so much the active opposition as the *apathy* of the natives that some fear may prove a cause of failure; but in this particular much more has been imputed to them than they deserve. The Hindoo is by no means apathetic when he thinks he sees his way and feels himself safe. What has been called his "apathy" would have been much better designated "timidity." He shrinks from unknown risks, and he is paralyzed by known dangers. Under a Mahomedan government, where he has no security even for the safety of his crop, and where he has the surest conviction that if he succeeds in making money he will be plundered, he

naturally is out of heart; but he is by no means "apathetic" when he is carrying on trade or agriculture in a safe and prosperous British district. He was "apathetic" when employed as a labourer under the old system, whether of serf or statute labour, or when his daily wages were fixed irrespective of the amount of work executed, and even that paid at irregular periods by a middleman who cheated him of half, but he is by no means "apathetic" when employed as a navvy on the great irrigation works, receiving his pay promptly, directly, and by the piece.

For example, one and a half cubic yards of earth per diem used to be considered a man's work in excavation under the old rules, and people fancied the Indian labourer could do no more on account of his slight frame and feeble physique. So far from this being the case where the system has been tried of paying by measurement, viz., so much for every cubic yard excavated, the average tale of work is not less than four cubic yards per diem, and five or six yards is by no means unusual in cuttings averaging a yard deep. Again, palankeen-bearers, who are paid by the distance, think nothing of carrying a traveller from twenty to twenty-five miles at a stretch, and are often known to do more.

There is, indeed, great endurance and perseverance in the Hindoo, when he feels himself at home in his work; his vision, indeed, is limited; he is slow to see prospective advantages, if at all of a novel description; he fears to venture on a new path; he knows that his

old ways have enabled him to get his living, though perhaps but in a scrubby way, and he prefers to bear the ills he has rather than fly to others which he knows not of. But when he has once realized the fact that a new system is safe and profitable, there is no hesitation. He can appreciate facts, though he is not disposed to trust in theories.

When irrigation from the Kistna was first carried, not many years ago, into a part of the Guntoor district, where nothing but dry crops had previously been grown, the ryots declined to make use of the water, saying that their land had always been sown with dry grain, and would grow nothing else. The engineer in charge of the works obtained permission for some of his own subordinates to cultivate a few fields with rice, under irrigation, as an experiment, and they of course succeeded; the ryots saw the fact, and gave it the credence no arguments could have obtained. Last year, in consequence, thirty thousand acres of wet crops were raised in that very tract where none but dry cultivation had been believed possible!

When men are employed on daily wages it is their interest to reduce the standard of a day's work to its minimum. When overseers and timekeepers are paid by regular salaries, it is their interest to protract their tenure of office as long as possible; and these systems, which have been almost universal in India, have, I am convinced, greatly conduced to the character for idleness and apathy which the natives have obtained. But I know from personal experience that it is quite possible

to induce native labourers to take task or piece work, to be paid at per quantity done either by daily measurement or on petty contract by the lump; that there are very few descriptions of work to which this *ad valorem* rule cannot be made to apply, and that where it is adopted, and the overseers paid by a per-centage on the amount of work actually performed, the result is most satisfactory; industry takes the place of idleness; exertion of apathy. The *work* is done both quicker and cheaper, while the *workmen* earn more money in a shorter space of time.

Again, in former days everywhere, and in the unimproved districts still, the working classes, as a body, were over head and ears in debt. Grain dealers, landed proprietors, or heads of villages, found it their interest to keep them so.

Advances were made to them at usurious interest, which they had to work out, and thus they were as entirely slaves to their creditors as if the "peculiar institution" had been recognized by Government. Small farmers were equally in debt, and raised their crops for the creditors' benefit instead of their own, and the creditors of course keeping the price down to the lowest, the farmers had hardly a chance of getting their heads above water. It is easy to see that such a state of things must induce either despondency or recklessness, and so generate idleness and apathy to an unlimited extent. In the improved districts, however, of late years, the lower classes have been enabled to shake themselves free in a great measure from this incubus of debt, and the

gross value of their land and labour have been nearly doubled. In the Godavery delta solvency is the rule, and it is a man's own fault if he is the slave of a creditor.

The competition of the natives is a much more substantial objection than their apathy (we will say nothing about the slightly contradictory character of these two "difficulties"), and it is one that may be supposed likely to become more formidable as the natives grow more enlightened. But at the same time it will change its character, and assume by degrees the style of ordinary competition between man and man on equal terms. For, in proportion as the natives improve in wealth and civilization, so also will their wants increase, and as they will have acquired the power to compete effectually, they will have lost that bald simplicity of life which now enables them to compete cheaply. Doubtless some time must yet elapse before the personal and family expenses of a Hindoo farmer come up to those of an English one, but the first steps of the approximation may already be observed.

The natives live more expensively than formerly. In the improved districts, for example, villages which, not many years ago, were mere clusters of huts, with mud walls and thatched roofs usually in bad repair, now exhibit substantial houses of brick and mortar, with tiled roofs. The agricultural classes are better clad, and much better fed, the number of carts and draft cattle has greatly increased—the former are built on a better model, and the breeding and keep of the latter

are better attended to, an improvement which is greatly due to the cattle-shows established by Government. Moreover, the natives travel more than they did, availing themselves freely of the railways and the track-boats on the canals. Many keep ponies and hackeries (covered carriages usually drawn by bullocks), whose fathers never aspired to any conveyance save their own feet. Many natives of the lower orders sleep upon charpoys (small bedsteads) instead of on the ground as formerly. A ryot, a little above the lowest grade, has usually a chair or two in his house; and spoons, plates, cups and saucers, tumblers, lanterns, and other articles of minor luxury, are coming into general use even among labourers.

Wherever there is anything to be got, and fair play to get it, there must be competition; but there is no reason why it should be more feared in India than elsewhere. After all, the parties are not so unevenly matched. The alleged advantages of the native are—first, that his necessary household expenses are only half those of the European, and this for the present is indisputably true. The second, that all natives league together for mutual support against all Europeans, and combine to spoil those Egyptians by every means in their power, admits of a ready answer.

That natives should like one another better, and be more disposed to favour one another than strangers, is natural enough; but even in a Hindoo, clanship is not stronger than self-interest, and he will rather buy a good article from John Brown for a shilling than a bad

one from his own brother for two. Moreover, the natives of India are in general more disposed to trust the English than their own countrymen in money matters. And it will be the fault of Englishmen themselves if this honourable confidence does not continue.

In all other points, the advantages are on the side of the European settler. He has, or should have, greater command of capital, better education, more versatility of talent, more comprehensiveness of idea, greater powers of organization,—all the advantages, in short, which a cultivated intellect should possess over an uncultivated one. He has, or should have, more moral prestige; and even with respect to technical qualifications, agricultural skill, and the like, it is his own fault if he is not at least on a par with the native.

CHAPTER III.

CAUSES OF THE FAILURE OF EUROPEANS.

THE practical character of this work would suffer if I did not point out the causes to which the failure of European enterprise in India may usually be attributed. The following cases are based upon actual occurrences:

A gentleman without any practical knowledge of farming, whose previous pursuits have been mainly of a sedentary character, takes, in the declining period of his life, an extensive farm at a somewhat high rental. He appoints a native steward to manage it, and is himself an absentee for two-thirds of the year. Is it very surprising that the steward should grow fat, and his master become a bankrupt?

A young man, energetic and well up to his work, but without the necessary capital, takes a piece of land, and mortgages it for the funds needful to carry on his enterprise. He goes ahead in dashing style, but has the misfortune to find his first crop under the average, as crops will be sometimes. The result is, that he finds himself involved in difficulties which it will take years to surmount, if he ever does extricate himself from them.

A gentleman of sanguine temperament, having, perhaps, some theoretical knowledge of what he undertakes, but without practical skill, takes a small farm, say two hundred acres in extent, and immediately sets up a steam-engine, builds warehouses, and purchases plant, all on a scale suitable for an estate of four times the size. If he should, utimately, find that his net profits barely cover the interest on his outlay, have we any reason to feel very much astonished at the result?

An estate is all that could be wished, if the owner is attentive to his business and thoroughly competent, the subordinates honest and careful, the profits yield an ample per-centage on the outlay. Yet all this is neutralized by extravagance in living. An open house is kept in princely style. A lavish hospitality and other little weaknesses, by no means unknown among Englishmen in India, are indulged in. Will this speculation, after all, be a successful one?

If an individual, or a firm, perhaps a company, take an estate, and entrust its management to an European adventurer, of whose character and antecedents they know nothing save what he has been pleased to tell them, is it quite fair to attribute possible failure of the experiment to causes peculiar to the country?

It is the intention of an individual or a company to found a business on a large scale, but instead of awaiting the natural development of their plans, they begin with a complete establishment suitable to the requirements of the concern when it has attained its full growth. If the needless outlay of the first few years

prove a burden too heavy for the subsequent prosperity of the undertaking to bear, is not the result a good deal that person or company's own fault ?

A farmer, dependent solely on his farm for his living, and having no spare cash to throw away, departs from the safe beaten track, and tries experiments. They fail, perhaps, as experiments will sometimes ; but in such a case the farmer is not unlikely to fail too.

A military officer, altogether innocent of economics, invests in land the proceeds of the sale of his commission, and then muddles away his means by that mysterious art of mismanagement which is quite independent of extravagance, speculation, or any other vice. But this is a transaction by no means peculiar to British India.

A man of more wit than honesty finesses too much, and overreaches himself. Or, by harsh and oppressive conduct, he earns the hatred of his native neighbours. He is suspected of being a slippery customer, and under any or all of these circumstances, he is as likely to come to grief in India as he would be in England or elsewhere.

Judging from these several cases which have occurred within my own knowledge, the causes of the failure of Europeans in India are of the same character as would end in failure elsewhere. For the sake of greater distinctness they may be summed up as follows :—

Ignorance of the work undertaken, which may arise either from the want of training and experience, the want of technical knowledge of the particular work to be done (a defect that may be easily remedied), or

deficiency of administrative capacity for work in general.

Neglect of one's own business, whether occasioned by a disposition naturally given to indolence, or by over-confidence in servants. The latter is hazardous, however carefully the servants may have been selected.

Want of caution in the choice of one's servants.

Going ahead too fast, and so getting into debt. Disproportion of means to ends; and this may arise either from the inadequacy of one's capital at the first, from the creation of an establishment or plant above one's requirements, from over-building, or the employment of expensive processes in place of cheap ones which would do as well, or from employing two men to do the work of one.

Personal extravagance, and other vices on which it is not necessary to enlarge, but for which India offers but too much opportunity.

Rashness in experimentalizing, an error particularly liable to beset young and ardent men with strong views about reforming abuses, dispelling the darkness of barbarism, or urging the march of civilization into a gallop.

Rashness in speculation, caused by being in too great a hurry to grow rich.

General incompetency, or "muddleheadedness."

Being too fine a gentleman to attend to one's dirty work, or too much occupied with the development of great ideas to take any interest in details.

That men not disqualified by one or more of the above unhappy traits of character and unfitness have succeeded, and do succeed, as planters in India is notorious; and their success affords sufficient proof that Europeans are not predestined to fail by any inherent difficulties in the case. It is true, the day for making fabulous fortunes of rapid growth has passed away. Since publicity took the place of secresy, a man cannot now expect to find a little Eldorado in some part of India, and keep the world in ignorance of his secret. Certain other antiquated forms of money-making also, with which publicity does not agree, have been relegated to the region of the lost sciences. But planters and farmers *do* live and thrive, and realize respectable incomes; and as the country becomes more and more opened up, as the great works of irrigation and communication are extended, their position and prospects will be improved even beyond their present expectations.

Those who see any force in the objection that landlords, not planters, are wanted in India, and that landlords must necessarily be natives, are referred to the remarks in my concluding chapter. The want of India, it will be seen, is a middle-class population, guided by European example to adopt all the conveniences and some of the refinements of civilized life. It will be seen that I contemplate the existence of a stationary population of this character in the uplands of Southern India, and have by no means thought of promoting a system which would lead to all the evil

consequences of absenteeism as developed, for example, in the West India Islands.

But it is time now to bring these general observations to a close, and proceed to details.

CHAPTER IV.

GENERAL VIEW OF INDIAN FARMING.

A YOUNG man intending to become an independent farmer in Southern India should land with a capital of not less than 1,500*l*. He should devote the first year almost entirely to learning his work. It would be good policy to get employment during that period in a subordinate capacity, on some respectable farm or plantation of good standing. It would be worth his while to give his services for the year for nothing save the privilege of seeing how matters were managed, and in the present dearth of trustworthy subordinates, he would have no difficulty in finding such a place. He should then set to work with a will to make himself thoroughly master of every particular connected with Indian farming. He should, of course, learn the vernacular of the district, talking as much as possible with the native cultivators. He should acquire a thorough knowledge of the various soils, their suitabilities and requirements, of rotation of crops, of the breed and treatment of cattle. He should find out all about work and wages, and all local customs peculiar to the district; almost every district has some

of its own. All about markets, roads, and other means of communication. How people of all sorts transact their business, and how they live. He must of course exercise his own good sense and discretion, comparing assertion with assertion, and weighing allegations against probabilities, not taking everything he hears for gospel, nor concluding that because a thing happens to be the practice in India, it is therefore inevitable.

But also must he guard against the opposite and equally common error of concluding that whatever is, is wrong, that the Hindoos are ignorant barbarians, their customs blind habits, and radically bad; that English methods must be always suitable everywhere, and may safely be transplanted to India without modification; or even that native superstitions and prejudices are always without some distant foundation in fact. He may often gain a great deal of information from such prejudices and superstitions, if he will take the trouble to analyze them; they often have or had a true general principle for foundation, though so overlaid with the adjuncts which priestcraft or fancy may have heaped upon it, as to be almost indistinguishable; and the processes dictated by them are often substantially right, though the so-called reasons given for them are usually wrong.

During his year of apprenticeship our embryo farmer may be on the look-out to select a site for his future operations. If he has the cash, it would doubtless be his best plan to purchase under the new regulations for the sale of waste lands, otherwise rent varies from

eighteenpence to eighteen shillings an acre according to quality and site, the latter being for the best land, under reliable irrigation, and inclusive of water-rate. This class of land is suited for the cultivation of rice, sugar, chillies, turmeric, etc.; these are called wet crops, and will be more fully described in a separate chapter. They can only be grown on irrigated land, the average rent of which, including cost of water, is thirteen or fourteen shillings the acre.

On the higher plains, what is called dry cultivation is carried on, viz.: oil-seeds, hemp, vetches, maize, millet, and similar grains, cotton and indigo; the latter are much improved by a little irrigation, but do not require much. The rent of this land varies a good deal, but seldom exceeds five shillings an acre.

On the plateaus of the hills, and on their spurs, coffee, pepper, and cardamoms are grown, and tea, cinchona, and vanilla have been introduced with success. Bona fide waste land of this description can be had on application to Government under the recent regulations within British territory; and in the new and promising plateau of Peermaad in the territories of the Rajah of Travancore, by application to the native government through the British resident at Trivandrum.

In selecting a site for farming operations, whether for wet, dry, or hill cultivation, great caution is of course requisite, and many conditions should be looked to in estimating the value of the land, and the prospect of success. The quality of the soil, the supply of water, the facilities for drainage, the salubrity of the neigh-

bourhood are essentials that would occur at once to the mind of an intending purchaser or tenant, but there are some others which a man of English experience only, accustomed to regard the conveniences of civilization as matters of course, might either overlook, or take for granted. First:—

The means of transport. How are you to get your produce to market? Is it by canal, or by railway, or by a good road, or by a bad one, or by none at all? You will find the value of your land depend very greatly on the method of transport to and from your market, and so far the fact is sufficiently self-evident to make it seem absurd to notice it; but the ratio in which value varies with facilities of access in India is not a matter so generally known. The gradation of cheapness in means of transport, is in the order aforesaid.

On the Godavery canals the freight for stone, &c., *exclusive* of demurrage, was three-eighths of a penny per ton per mile. For grain and other farm produce, *inclusive* of demurrage, three farthings per ton per mile, the native farmers and dealers usually detaining the boats two or three days at each terminus.

This was with native boats of small tonnage; properly constructed boats, however, of three times the tonnage, could be worked by the same amount of labour, and the actual cost of transport would not exceed one-eighth of a penny per ton per mile.

In the same district, the difference in the price of produce grown on the banks of a canal, and of produce grown ten miles from it and requiring to be carried that

distance by coolies, was as 15 to 13. Giving an advantage to the farmer on the bank of upwards of fifteen per cent.

The charge by railway is about a penny per ton per mile.

Upon good roads, bridged and metalled, a native cart will carry half a ton; on a bad road, about 600 lbs.

The hire of a cart averages eighteenpence per ten miles, making on a good road $3\frac{3}{5}d.$, and on a bad one about 6*d.* per ton per mile.

At present rates the cost of carriage upon bullocks is about 7*d.*, and by coolies 8*d.* per ton per mile.

The foregoing averages are, however, liable to many variations; for instance, in the plain country, an unmade road, which in the rainy season is almost impassable, owing to deep mud and full rivers, will often during the dry months be found almost as easy as a metalled one, and native carts will carry 1,000 lbs. over it without difficulty.

Coolie carriage, viz., on men's heads or shoulders, also varies greatly, both as to the weight carried, and the wages required.

On firm ground, tolerably level and for short distances, a man in the Telugu country will carry one hundredweight; while in the hilly, jungly tracts of the Hills and western coast, the coolies often refuse to take loads above fifty pounds.

For long distances, in the Carnatic and Mysore, seventy-five pounds used to be the regulation load, but the men would usually carry a little more.

The wages for bearers, who carry on their shoulder, are at present almost everywhere sixpence per man for ten miles. For coolies, who carry on their head, they vary from threepence to fourpence halfpenny, but are very likely to increase.

All these points, with reference to the special localities, should be inquired into before settling.

Moreover, it is essential that one's rights to water supply should be definitely established.

If water from existing channels or reservoirs can be had? How much, and at what rates?

If no such present sources exist, then a right should be stipulated for to dam up any streams or drainage that may pass through the estate, and provision made that no future tenant of land, on a higher level, should be permitted to divert or cut off the supply.

Constant squabbles and litigation arise from such conflicting interests where definite rights have not been clearly established at first starting.

Also, if your estate does not lie upon the line of any Government road or canal, the right of way by customary tracks should be ascertained; for it is by no means unusual for the native farmers to plough across such tracks during the cultivation season, and compel all transit to make a long détour.

Such special information as may be requisite upon the subjects of the character, processes, and results of the different varieties of Indian farming will be more conveniently shown under the distinct heads of wet farming, including the theory and practice of irrigation,

dry cultivation, and hill farms, which will now be considered successively, with the understanding that the information given does not profess to be exhaustive, but only to be substantially correct, and, as far as it goes, trustworthy as a primer or introduction to the subject.

CHAPTER V.

WET FARMING.

Wet farming is the term applied to the cultivation of such crops as require a continual supply of water, and which are usually supplied therewith (at least in part) by artificial means, whether by streams drawn off from rivers dammed up to the requisite level, or from tanks or reservoirs, constructed to store the rainfall or the fitful freshets brought down by the smaller streams.

Previous to undertaking any cultivation of this kind, it is necessary to ascertain the amount of supply that may be fairly counted on.

The demand upon the artificial sources of irrigation varies greatly, both with regard to the sort of crop, the nature of the soil, and the normal character of the rainy season in the locality. Thus in Malabar and Canara, where the rainfall is from 130 to 150 inches per annum, there is little or no tank irrigation, nor any necessity to store water; but the small natural water-courses of the country are dammed in different places to raise the water to the level of the fields, and thence it is guided in small artificial channels where required.

Further south, again, in the Nunjenaad district of Travancore, extending between the mountains and the sea, from Colachel to Cape Comorin, the average rainfall does not exceed sixty inches, but is distributed over a longer season, as that part of the country partakes of both monsoons. The storage of water in tanks is necessary here, but only in moderate quantity, for two-thirds of the cultivation season it is probable that no artificial irrigation may be required; but occasional breaks of dry weather from fourteen to thirty days in duration may occur, and then it is indispensable to have a store to fall back on. In calculating the requisite provision, an average of one cubic yard of water per hour per acre will, in the Nunjenaad, be amply sufficient even in bad seasons and including evaporation. And this, for the long crop of five months, would be met by the storage of 3,600 cubic yards, or 607,500 gallons for each acre to be cultivated.

On the Eastern coast the rainfall is less, and the requirements for artificial irrigation may be averaged at 2½ cubic yards per hour per acre; sandy fields sometimes taking as much as three. 10,000 cubic yards, or 1,687,500 gallons per acre for the season of five months will, however, be an ample supply for rice under any circumstances, except perhaps in very deep sand, and will include provision for loss by absorption and evaporation.

One and a half cubic yards per hour will suffice for sugar-cane, but the provision must be continued for ten months.

In rice cultivation the fields are levelled, and each surrounded with a low embankment from 9 to 18 inches high, called in Tamil a vurrapoo. The fields thus form a succession of low terraces, falling gradually from the tank or channel, which supplies the irrigation, down to the drainage cut which carries off the surplus water. The water being admitted first into the upper tier, flows gradually down from terrace to terrace till all have been saturated, when the surplus is permitted to escape.

The fields are well wetted previous to ploughing, and the supply of water, after the young leaf appears, must be kept up with little intermission until the last fourteen days previous to cutting the crop.

If the water can be kept constantly flowing at a slow velocity over the fields, at a depth of two or three inches, it is the perfection of irrigation, but, until the ear is formed, the plant will stand almost any amount of water, provided the tops are above the surface, while if occasionally there shall be no water on the field for a day or two, no injury will result, provided only that the surface of the earth has not time to become hard and caked. The natives have a tradition that during the third month, the water on the rice-fields should not be less than eighteen inches deep, but this evidently had reference to a state of affairs when supply was uncertain, and the custom of providing for it by high vurrapoos was in fact only making the field its own reservoir. In the present day it is usually unnecessary. Irrigation must be kept up till the ears are full, but when that has taken place, and the heads begin to turn

yellow, all surface moisture should be drained off, or the grain may rot.

Rice is usually sown by the natives broad-cast, and then little more attention paid to it, but in the improved districts the practice of transplanting is coming into general use. The seed grain is thickly sown in small fields carefully watered, and when about eight inches high, the young plants or "new leaf," as the natives call it, are transferred by hand to the larger fields, where they are to grow to maturity, planted out in rows at from nine to twelve inches apart, two or three plants dibbled into each hole. This is usually done by women, and although of course the process adds to the cost of cultivation it is found so greatly to increase the yield that it is in course of general adoption wherever good soil and unfailing supply of water make it worth while.

There are very many varieties of rice, but for practical purposes only a few need be mentioned. The first crop, finest grain and heaviest yield, called Peshanam in Telugu, takes five entire months of irrigation. It is grown on good land where a certain and early supply of water can be secured. It is sown as early as it is possible to commence irrigation, say about the middle of June for an average, and is ready to cut in December or January.

Another also, of white rice, called Sanawari in Telugu, is a later crop, and in the Nellore district is ripe by the middle of March. The same date will also serve for the Kasari, of red rice.

Black rice (Iswara Kora) is ready to cut at the end of March; or, in the Godavery district, where it is usually grown as a second or dry season crop (Dalwa), a month later.

It requires about three months' or fourteen weeks' irrigation. The yield of the Dalwa is always less than that of the first crop, the difference being on the average as 11 to 15.

The average yield of rice cultivation, first crop, was found to be as follows, as per result of a great number of experiments conducted in different parts of Southern India—the rate is in pounds of paddy per acre.

	lbs.
Best white rice, fully irrigated	2,400
Maximum shown by the experiments	3,650
Red rice, fully irrigated, averaged	1,800
Black rice, partially watered, averaged	1,200
Black rice, dependent on rain only, averaged	700

A few examples from actual practice will illustrate the cost of cultivation and net profit.

An acre of white rice under perfect tank irrigation, in the Shencota talook, Travancore:—

EXPENSES.

	£	s.	d.
Land tax, including water (very high)	0	18	0
Cost of cultivation (cheap)	0	9	0
Total	£1	7	0

RETURN.

	£	s.	d.
3,360 lbs. paddy, sold for	3	7	2

Net profit .... £2 0*s.* 2*d.*

In this case the straw was not valued, there being no

demand for it. It was burnt on the land for manure, thus reducing cost of cultivation.

An acre of irrigated rice in the Tanakoo talook, Godavery district, showed as follows :—

EXPENSES.

	£	s.	d.
Land tax and water rate	0	12	0
Cost of cultivation	0	10	0
Share of plant	0	2	0
Total	£1	4	0

RETURN.

	£	s.	d.
2,450 lbs. paddy, sold for	3	1	3
Straw	0	6	0
Total	£3	7	3

Net profit .... £2 3*s.* 3*d.*

An acre of red rice, under pretty good, but not perfect tank irrigation, in the Nellore district, the soil being the ordinary black earth called "Black cotton soil," showed as follows :—

EXPENSES.

	£	s.	d.
Land tax, including water	0	10	0
Cost of cultivation, &c.	0	12	0
Total	£1	2	0

RETURNS.

	£	s.	d.
1,600 lbs. paddy, sold for	2	0	0
Straw	0	7	0
Total	£2	7	0

Net profit .... £1 5*s.* 0*d.*

Now take as a contrast the results of an acre of black

rice dependent solely on the rain in an unirrigated portion of the Masulipatam district—

EXPENSES.

	£	s.	d.
Land tax	0	12	0
Cost of cultivation	0	8	0
Total	£1	0	0

RETURN.

	£	s.	d.
960 lbs. paddy, sold for	1	4	0
Straw	0	5	0
Total	£1	9	0

Net profit .... £0 9*s.* 0*d.*

The land tax however was, in this instance, exorbitantly high and has since been reduced.

An acre of rice without irrigation in Orissa showed—

EXPENSES.

	£	s.	d.
Land tax	0	5	0
Cost of cultivation	0	8	0
Total	£0	13	0

RETURN.

	£	s.	d.
650 lbs. paddy, at average value	1	0	0
Straw	0	7	0
Total	£1	7	0

Net profit .... £0 14*s.* 0*d.*

The average rain-fall per annum during a period of six years in the Godavery district was 35·2 inches. The maximum was 46·4 inches, and the minimum 19·9. This will serve to illustrate the extraordinary variable-

ness of the monsoons, and the necessity for proportioning our storage of water to the possible requirements of the worst year.

Sugar-cane is a most valuable crop, but requires greater care and more capital than rice. It is grown on the western coast, and in the irrigated deltas on the eastern side of India, with great success. In these deltas the rich alluvial soil suits the plant admirably. Black earth, where nodulous limestone is found, or a deep, warm, brown earth, composed of clay and sand, mixed likewise, answer very well. If the soil is too clayey and stiff, trenching will be needed to get rid of the water, for though the canes require an almost incessant supply for ten months, it is essential that no stagnant pools should be allowed to collect at the roots.

The cane when ripe averages eight or nine feet high, is of a golden colour, streaked near the top with red, is jointed, having about fifty joints to a cane, and adorned at the top with beautiful clusters of long, narrow, dark green leaves.

The fields may be prepared by the hoe or the plough, the latter being the most economical and, I believe, to the full as effective. The ploughshare should be rather broader than usual, the furrows being about seven inches deep and eighteen wide, and from three to four feet apart from centre to centre. Planting is effected by laying the tops of the old canes, which are full of eyes, buds, or gems, horizontally in the furrow, two or three together, and the lots from two to three feet apart. They are then covered with two or three inches of earth,

and in about a fortnight the young shoots make their appearance: more earth is then added from the ridges, which, by the time the plant is half grown, should be entirely levelled,—the whole field, except in stiff, clayey soils, having a smooth and even surface. Great care must be taken to keep the field clear of weeds, and to remove any additional suckers which may make their appearance after the canes have begun to joint. The said suckers are too late ever to come to anything, and will only draw off nourishment from the good canes. The time to plant is as soon as a supply of water is available,—thus, in the Godavery delta, in the beginning of June or end of May. The crop takes eleven months to come to perfection.

After the crop is cut, a second may be got from the same roots, and they will even produce fresh shoots the third year; but after the first time the ratoons degenerate, and it is much better policy to plant afresh. The best artificial manure for sugar-cane is a compost of vegetable ashes, decayed leaves, and dung; but in the great deltas, where the river water brings down an enormous quantity of earthy and vegetable matter with it, the silt which it deposits on the fields is the best of all possible manure.

Sugar-cane plantations have many enemies, and are exposed to great risks. On the western coast, wild elephants sometimes invade them and destroy, trample, or tear up far more than they eat. A deep trench or moat with sides as steep as the earth can be persuaded to stand, is the best barrier against these huge brutes.

Wild hogs are also very destructive. The natives in some parts have a curious method of protecting their plantations against these enemies, by stretching a small cord, supported by sticks, at twenty or thirty feet apart, all round the field, at about half-a-yard above the ground. The thing appears an absurdity, but they seriously maintain that the string does keep out the pigs, and it is still more difficult to believe that such a conviction could obtain without some foundation in fact. The wild pig is extremely wary and cautious, and it is possible that he may take the cords for snares, and consider it judicious to avoid them.

In the Godavery and other deltas, wild elephants are not found, and wild pigs very rarely; but in lieu of these two nuisances, the plantations are liable to be infested with rats, which have sometimes been known to destroy a whole plantation in a few nights. The natives often poison them, but this is objectionable, as when poisoned the vermin always take to the small channels, on which very often the poor people are dependent for their drinking water.

Some farmers encourage snakes on their plantations. These reptiles certainly destroy the rats, but in the interests of humanity, one feels bound to protest against any arrangement that tends to increase their number. By far the best plan in India is to keep a few mungooses on the estate. These creatures are hostile alike to rat and snake, are innocuous to man, and do no damage to any sort of crop.

The last great enemy of the sugar-cane is the insect

race. Several varieties infest it which are best guarded against by cleanliness and careful weeding; but the worst of all is a species of aphis (?) which often causes extensive blights, and for which, I believe, no remedy has been devised. It may, however, be remarked that, as it is always after long continued dry weather that this scourge appears, and as a heavy down-pour of rain is found to be the best cure for it, we may perhaps conclude that a good washing from the spout of a fire-engine might have a similar effect, destroying the insects and clearing the leaves of their eggs. It is at any rate worth trying.

The first steps in the manufacture of sugar,—as far, that is, as the production of "brown" or "moist" sugar, and separating it from the molasses,—must be taken by the farmer himself, unless he may be in such immediate neighbourhood of a factory, as to be able to send his canes there as soon as cut, for neither they, nor their juice, will stand keeping. The ordinary process, therefore, to this extent will be explained; all further processes not necessarily appertaining to the cultivator's department being omitted.

When the canes are ripe, they should be cut into pieces about a yard long, made into bundles, and taken to the crushing-mill. This is usually worked by the natives by bullock power, but in the deltas water power may usually be commanded, and on small estates will prove cheaper than steam.

The juice should go to the clarifying boiler as soon as expressed, or it will speedily ferment. In this first

boiler, care should be taken not to allow the liquor to boil fiercely. As soon as the scum rises and breaks into white foam on the surface, the fire should be extinguished, and after a little time given to settle, the liquor drained off into the second or evaporating boiler, where it is boiled and skimmed. This process is continued until the liquor becomes thick enough to be drawn out between the fingers in a viscid thread. Native farmers usually mar this process by a misplaced economy; but to effect it properly the liquor should be passed through four boilers in succession, and if the impurities are considerable, lime-water added in each.

Quick-lime should also be thrown into the first or clarifying boiler, when the juice is first introduced, in the proportion of about half-a-pint to 100 gallons, to combine with the superabundant acid.

The refuse fibre of the canes, after all the juice has been expressed, serves for fuel for the boilers, and the leaves serve as food for cattle. When the liquor has become sufficiently inspissated, it is transferred to the coolers to granulate; that is, for the crystals to separate from the molasses; and this done, the sugar is removed to cullenders usually made by piercing small holes in the bottoms of tubs to allow all the treacle to drain off. Where machinery is employed, however, this process is both accelerated and improved by a centrifugal sieve, a cylinder of wire gauze revolving rapidly in a larger cylinder of wood or metal, which is stationary. The sugar is placed in the inner receptacle, by the rapid rotation of which every particle of molasses is driven off

into the outer vessel, from the bottom of which it runs off into tubs placed to receive it.

An acre of sugar-cane on good soil, and well watered, has been found to yield with careful cultivation about 2,000 lbs. 400 gallons of juice give on an average 60 gallons of sugar and molasses.

One acre at Dodeputla in the Godavery delta, under native cultivation, gave the following results :—

EXPENSES.

	£	s.	d.
Land tax and water rate (low)	0	10	0
Ploughing (native fashion)	0	4	0
Value of plant	0	11	0
Manuring, &c.	1	4	0
Clearing, weeding, &c.	2	0	0
Cutting crop, &c.	1	2	0
Total	£5	11	0

RETURN.

	£	s.	d.
1,600 lbs., at market rate	13	6	8

An acre of sugar-cane in Orissa under native cultivation showed as follows :—

EXPENSES.

	£	s.	d.
Land tax (high)	1	5	0
Ploughing	0	3	9
Value of plant	0	10	0
Manuring, &c.	1	11	0
Water	0	16	0
Cleaning and cutting crop	2	16	0
Total	£7	1	9

RETURN.

	£	s.	d.
28 maunds and 5 seers	12	10	0

Interest on prime cost of machinery is not included in the above expenses. The charge for water, in the second example, includes the cost of baling in the dry season, which, in the former one, was not required, the land being under channel irrigation, with a constant supply at a high level.

An inferior sugar is made in India from the sap of the Palmyra palm. The sap is collected as for toddy, by cutting the branches at the head of the tree, and suspending earthen pots below the cut, these are removed in the early morning. The processes of boiling, &c., should be much the same as for cane sugar.

Cocoa-nut plantations may be admitted under the head of wet farming, for though few attempts have as yet been made to rear them under artificial irrigation, it is quite possible to do so, and the trees will not thrive or even grow without an ample supply of water. Their cultivation has hitherto been mainly confined, as far as anything like extensive plantations are concerned, to the western coast, which is indeed fringed with them for nearly its whole length. The heavy monsoons on this coast, and the extensive back-waters, which, during the dry season, are locked up by natural bars to some height above sea level, and which thus keep the low belt of land along the coast continually moist, furnish the ample supply of water which the trees require, and the neighbourhood of the sea is highly beneficial to them. They may be found growing and thriving even within the wash of the waves, and are nowhere so productive as on

the sandy slip of land which lies between the ocean and the back-waters.

The trees require but little care, and are very profitable, every part is of value. The nuts yield oil, their husks make very serviceable rope, much used in the merchant service for running rigging; the very leaves are used for thatching houses, and are worth about two shillings a thousand; the wood serves for rafters and reefers in roofs of small span, and the sap yields an intoxicating drink, from which arrack may be distilled.

A young man whose capital was considerably under 1,000*l*. got a grant of a large tract of submerged land in one of the back-waters in Travancore, at a very low rental. He partially drained it, and planted it with cocoa-nuts. At the end of fifteen years he was offered 10,000*l*. for his trees, which he declined to accept, knowing them to be well worth double the money. He had been his own foreman and his own clerk, had worked with a will, and owed his prosperity, humanly speaking, wholly to his own exertions.

Cocoa-nuts should be planted quincunx fashion, 18 feet apart from tree to tree.

CHAPTER VI.

IRRIGATION AND DRAINAGE.

A MAN who intends to employ his capital upon wet cultivation of any sort in India, should be thoroughly "well up" on the subject of irrigation, both as to theory and practice. He may find himself located very many miles away from any professional adviser, and if he trusts entirely to natives, the result will be sure to prove unsatisfactory, for even setting aside any intentional advantage they might take of his ignorance, their ideas on the subject are usually limited to a few old rules based upon conditions fast becoming obsolete, and not sufficiently comprehensive for works on a large scale, so to utilize them as to ensure the maximum of efficiency, or to provide for, or render available, all the conditions of the locality.

No apology will therefore be required for furnishing, in this place, a plain explanation of the theory, and a few rules for the practice, of Indian irrigation.

The year in India being unequally divided into wet and dry seasons, there is, during the first, too much water, and during the second and longest, too little for

the agricultural requirements of the land. Therefore much of the most valuable land is, while left in the state of nature, so flooded during the rains as to be useless, and very much more is, during the dry season, an arid desert.

The rain which falls during the monsoon is of course partly absorbed in the soil, but the larger proportion runs off the surface of the higher lands, collects in brooks or streams, thence runs into the larger rivers, and after flooding to an immense extent the rich alluvial tracts near their mouths, finally discharges into the sea.

The quantity that thus runs to waste is something enormous. One foot of rainfall on a square mile gives 1,032,532 cubic yards, or 174,239,775 gallons, and the rainfall during a monsoon may be averaged at thirty inches at least. As rain in India usually falls in heavy plumps, the proportion absorbed by the soil is comparatively small. The monsoon of 1862 was under the average in the Carnatic, yet the quantity of water that ran to waste into the sea from the Pennair (a second-class river) after a sufficient supply had been drawn off for all the cultivation as yet existing under it, amounted to no less than 4,093,812,356 cubic yards or 691,830,835,075 gallons!!! sufficient to have irrigated nearly 1,000 square miles; this discharge was calculated from the register kept at the anicut at Nellore, and is substantially correct, but rather under than over the mark.

The object of irrigation works is to rectify this unequal distribution of water, to arrest that which would

otherwise run to waste, distribute it to the lands where it is required, and store up as much as may be needed for use during the dry season. They may be divided under two heads:—Channel irrigation, by means of canals taken off from rivers whose waters have been raised for the purpose by weirs constructed across their course. And, secondly, irrigation by means of tanks or reservoirs formed to catch the surface drainage or to store up the waters of the smaller streams.

The first class as applied to the larger rivers of India involve works of gigantic magnitude, vast embankments to protect the low lands from flooding, drainage channels equal to ordinary English rivers in capacity. They are undertakings of imperial calibre—quite beyond the measure of individual farmers, and therefore need not be further noticed here.

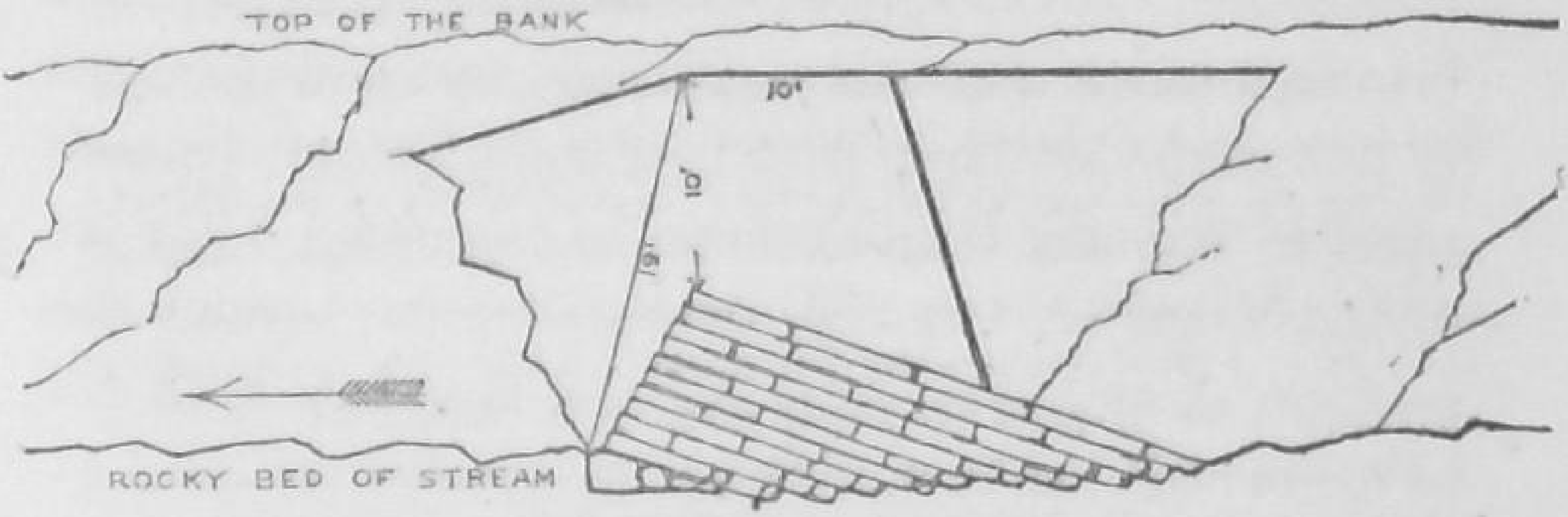
But in many parts of the country and more particularly in the hilly districts, smaller rivers are found, often with rocky beds, which bring down in spasmodic freshets, five or six times during a monsoon, a mass of water equal to the requirements of several thousand acres. It might probably be beyond the means of a private speculator, or beyond his wants, to construct such a reservoir across the course of such a river as should arrest the whole of its supply; but he might find it well worth his while to throw a cheap dam across it at a point high enough to supply the tanks upon his estate by a small canal cut for the purpose.

I have seen a dam of this construction in Travancore across a river fifty yards wide which was built 75 years

ago, has never been repaired, as far as can be ascertained, and is still in capital order. A similar one could now be built for 250*l*.

When the bottom is rock and there is plenty of stone in the neighbourhood, conditions common enough in such localities, an efficient dry stone dam may be built cheaply enough.

SECTION OF A CYCLOPEAN DAM, OR WEIR, ACROSS A MOUNTAIN STREAM WITH ROCKY BED AND BANKS.



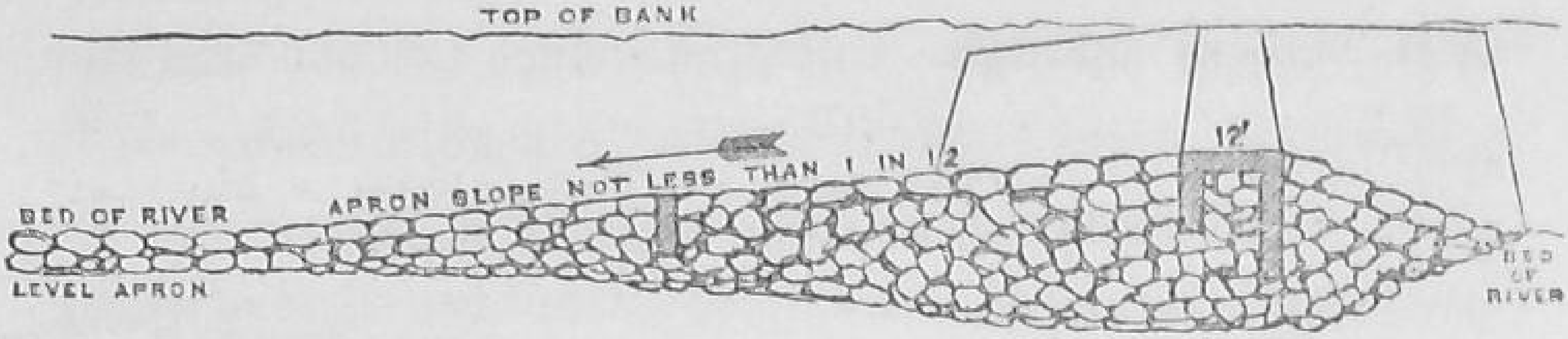
The dam is of large slabs of stone laid parallel to the stream, and packed as above, without mortar. The wings of rubble masonry in mortar.

The down-stream face thereof should be nearly vertical, the up-stream face having a slope of about one in four, that is, four feet of base to one foot of height; the stones should be long blocks or slabs about five or six feet in length and a square foot in section, the down-stream ends raised by cross blocks to give the requisite slope as aforesaid, and the upper tiers of slabs, all, that is, upon which the stream will directly impinge laid parallel to the current of the river. No mortar is required.

When the bed of the stream is sand or mud, a

different style of dam must be adopted. It should then be either a masonry work on the model of the Tank Calingala elsewhere described, or else a bank of rough stone without mortar, like a breakwater. The latter is

SECTION OF A ROUGH STONE DAM, OR WEIR, (ANICUT) ACROSS A STREAM WITH SANDY OR MUDDY BED.



The larger the size of the stone employed the safer will be the work. The stones are first thrown in upon the line of the Weir, and the mass will sink till it has acquired the depth of foundation due to the character of the soil. More stone is then added, the upper layers being carefully packed. No mortar is used. The shaded portions are retaining walls, and a floor of cut-stone masonry (in mortar), which may be added with advantage *after* the mass has finally taken up its settlement.

The wing walls may be of rubble masonry in mortar, and should be not less than three feet above the highest flood. The breadth of the level or tail-apron should equal that of the work itself.

usually the best construction. It requires no skilled labour, it is less likely to come to grief under severe and long-continued trial; it is the cheapest wherever stone is procurable within a short distance, and it is by far the easiest to build and to repair in case of accidents. Even where suitable stone is not procurable in the immediate neighbourhood, it is probable,—supposing plenty of lime at hand,—that masses of béton would answer equally well.

Indian rivers, both large and small, usually consist of a long series of alternate pools and rapids, and the most effective site for a dam will generally be found

to be, not *at*, but a little above the head of a rapid; sufficiently far from it to allow the work to have considerable length and comparatively shallow water. Then during the high freshes, the head of the rapid itself, which is almost always a narrow gorge, will hold back the water, will cause a considerable depth to stand back to the tail of the dam, and thus reduce the over-fall and consequent stress upon the work to a minimum. It is quite false economy to look out for a site where the stream is narrow, the supposed advantage of shortening the length of the body is more than counterbalanced by the increase in depth and width, and the work is exposed to more severe stress and is consequently less secure.

In the case of the small streams—with which alone individual planters are likely to have to deal, and which are the only ones necessary to notice in these pages,—the bed will be dry, or nearly so, during six months of the year, so that there will be very little difficulty in the construction of such a dam as is herein recommended.

The wing walls should be first constructed. These may be of rubble masonry, the foundations *not less* than six feet below the deep bed of the stream, the summit *not less* than three feet above the highest flood-level. The dam should then be made connecting them, with the up-stream face having a slope of three base to one height, and the down-stream face with a slope of not less than twelve to one; an additional tail apron on the natural level of the bed of the stream should be carried out as much further to the rear as would equal the entire breadth of the rest of the work. The summit

of the dam should be levelled about nine or twelve feet in width, and may be advantageously paved with cut-stone protected by retaining-walls built into the mass of the rough stone. This cut-masonry should, however, be added after the second year, as during the first floods the work,—that is, the mass of the rough stone dam—will sink considerably, will sink in fact until it has taken up the natural basis of settlement due to the nature of the soil. The proper section will have to be reconstructed the following year, and as a rough rule, the quantity of rough stone that will be actually required for the whole work may be taken as about double the theoretical amount given by multiplication of the length by the section of the original construction.

This consideration has hitherto been too much overlooked, and has been the reason why the actual cost of anicuts has so much exceeded the estimates. The difference has usually been met under the head of repairs, but as its occurrence is inevitable, it is much better that it should be provided for and calculated upon beforehand.

The apparatus of under-sluices, &c. requisite for great works upon large rivers, is unnecessary for the small streams now under consideration, and therefore there is no need to swell the present work by any explanations upon this subject.

The blocks of stone employed for the dam, especially for the upper layers, should be the largest that can be got or conveniently handled; even with unskilled labour, it will generally be found practicable to make

use of blocks averaging $1\frac{1}{2}$ or 2 tons weight, with the assistance of a tramway or railway composed of light bridge rails and a few moveable cranes,—the latter may be easily arranged in a very simple form, viz. an upright post supported by stays, with a traversing jib bearing the toothed gear at its lower extremity. Cranes of this beautifully simple construction are used at Portland, and lift with ease blocks of five or six tons weight. Only bear in mind as a rule to use the biggest stones you can.

When an estate is supplied with water from the great river works established by Government, the usual charge is 6*s*. per acre for the first crop of the year, and 4*s*. for the dry-weather crop, or sometimes 8*s*. for the two; the tenant is then at no expense either for construction or repairs of his sluice, feeder or supply channel or main drainage, but must himself make the petty distributing channels within his land, the cost of which averages 14*s*. per 100 running yards.

With reference to minor details of irrigation, the chief points to be attended to are to carry the distributing channels along the highest levels consistent with the head of water that supplies them, to cause the water to pass over the fields slowly, not to stagnate, but not so fast as to wash away the surface or hinder the deposit of the silt held in suspension; to economize the supply by passing it gradually from the upper to the lower terraces, and not to permit any to escape into the drainages as long as there is a possibility of utilizing it on a lower level. These rules are often very imperfectly attended to by native farmers, and the result is

that they waste a great deal both of land and water, and produce inferior crops at a greater expense than was necessary.

When channel irrigation from a river or large existing reservoir cannot be commanded, a very effective substitute may be obtained by sacrificing a portion of your land to the construction of a tank.

In most cases anywhere in the low country, when you rent a farm you will find tanks already existing, but as a general rule, they will require considerable improvement. Some, indeed, of the ancient reservoirs constructed long ago by rajahs or wealthy natives, are magnificent works, on a gigantic scale, furnished with cut-stone facings or revetment walls, with enormous sluices, richly adorned with sculpture, and with a mass of earth for an embankment, which might almost be mistaken for a natural hill. These were evidently got up regardless of expense, probably in most cases by forced labour; and as their originators had for object the attainment of religious merit by the execution of such works, quite as much as the acquisition of gain by the profits of improved cultivation, they were, of course, lavish of ornament, and careful to ensure such solid work as should hand down their names to the latest posterity.

But tanks of native construction intended solely for utilitarian purposes, are generally of the cheapest and least efficient description. Being made by the native farmers, either individually or by those of a village as joint-stock property, they labour under the disadvantages

of unscientific arrangement and parsimonious execution. They are, even under the most favourable circumstances, inadequate to the work they ought to do, and constantly liable to breach under any unusual pressure. Many of them, indeed, have been greatly improved by the British Government, but lack of funds and mistaken economy have limited these improvements, and until quite recently the views of minor native officials have been allowed far too much to influence the measures adopted.

When *waste* land is taken up, it will generally be found necessary to construct a tank or tanks. The ground should be carefully mapped, the levels taken and noted on the map twenty yards apart, so that the distributing channels may be carried along the highest, and the drainages along the lowest levels with the least waste of ground.

A tank should be placed at the highest level consistent with the necessary condition of ensuring a full supply of water. The area that will drain into the tank must be ascertained, and the drainage therefrom calculated from the average rainfall of the locality, and the absorption due to the character of the soil. It is impossible to give any general rule as to the ratio of drainage to rainfall. The surface soil, the sub-strata, the slope of the ground, and the nature and description of the vegetation upon it, must all be taken into consideration; also whether the rains usually fall in heavy plumps or in moderate showers. The ratio of drainage to sixteen inches of rainfall will be mightily different if the sixteen inches fall in three days, as

I have known to be the case, from what it would be were the same rainfall distributed over a fortnight.

In calculating the required capabilities of your tank to resist breaching, estimate your receipts from drainage at the maximum ; but for the area of cultivation which the said tank is to supply, reckon them at the minimum. You will thus be on the safe side in both cases.

The water which runs off the higher ground above your tank will find its way into it either by the natural nullahs or brooks, across the course of which your embankment is constructed, or if it should so happen that the said higher ground is only a long, sloping hill-side, without any natural nullahs leading into your tank, and at such an incline that the bulk of the water would run past your tank instead of into it, you must carry from the end of your embankment a ditch, with bank on its lower side, along, and gradually ascending, the skirt of the hill, to turn the flood as it descends into the required direction. These catch drains are sometimes several miles in length.

A tank is formed by throwing an embankment of earth either across the gorge between two rising grounds, or in a concave form on a sloping surface, the extremities carried sufficiently up the rise to retain the depth of water required in the belly of the curve. As a good average rule, two-fifths of the greatest depth multiplied into the superficial area of the water-spread of the tank when full, will give the cubic contents of water ; the depth being measured to the sill of the lowest sluice. The embankment even in small tanks should never be

less than 1½ yards higher than the surface of the water in the tank at fullest, and in larger tanks should be from 2 to 4 yards above that level, in proportion to the extent of the water-spread, and consequent size of the waves which a strong breeze may raise upon it. The top width of the bank varies from 1 yard in the smallest to 4 yards in the largest tanks. The slopes vary with the soil whereof composed. In the stiffest earths the inner slope (that towards the water) should never be less than 1½ base to 1 of height, nor the outer less than 1 to 1. In ordinary earths, 2 to 1 for the inner, and 1½ to 1 for the outer slope, will suffice. In loose friable earth, or such as has a great affinity for water, still greater inclinations must be given, and in banks formed of sand, 5 or 6 to 1 will not be found too much. The earth gets well trampled and rammed during construction, and except in the case of the very worst soils, puddled walls or cores are unnecessary; but the slopes should always be turfed, and the inner face further protected from the action of the water. This may be sufficiently effected in small tanks by planting the foot of the inner slope with some of the various plants common in India, which will grow thickly and well in water. Among these may be mentioned, as of common use and easily procured, the crow bamboo, called in Telugu, kakì idroo; the screw pine (Mogul donka), the common bulrush, the smaller varieties of bamboos, canes or rattans, and the lunka or gigantic feather-grass.

In large tanks the inner face should be revetted with dry stone to about a yard above full tank level.

The best construction is usually with the stone pitched at right angles to the slope, resting on a foundation benched into the earth at the foot about a yard deep, and with a backing of ballast gravel or quarry rubbish.

If, however, dressed stone be used, and it may often be got for the taking, from the walls of some old ruined fort; or if laminated stone be found, having the upper and lower faces tolerably level and parallel, the courses will be best laid horizontally, underlapping each other like a flight of steps, and with backing as aforesaid, which should never be omitted except when the material of the bank itself happens to be a gravel.

Trees should never be allowed *upon* the embankment, as their agitation by the wind may disturb its mass, but a row of trees planted along the foot of the *outer* slope is beneficial, tending to support the bank and keep it from slipping.

The embankment must always be carefully watched; any rat or snake holes, white ants' nests, or cracks that may form by the shrinking of the earth in the dry weather, attended to at once. The white ants' nests in particular should be dug up from their very bottom, the insects exterminated, and the holes carefully filled in and tamped, a few pailsful of whitewash impregnated with corrosive sublimate being thrown in during the operation. In all these things a stitch in time saves nine.

The earth for the *construction* of a tank, embankment, or bund as it is called in India, should always be taken from the inner side or bed of the tank, and not nearer than twenty yards to the foot of the slope.

For repairs the same rule holds good, provided good earth is procurable there, but old tanks sometimes become so silted up, that nothing can be got out of their beds near the surface but alluvial deposit, which is a very bad material indeed.

Every tank must be provided with an escape-weir or spill-water, called in Southern India, culzoo or calingala, to get rid of the surplus floods after the tank is full. These must, of course, be of sufficient capacity to discharge the entire quantity of water that can drain into the tank as fast as it comes in. The best site for such an escape is usually at or near one end of the embankment, selecting that from which the natural fall of the ground will easiest enable the surplus water to find its way into the nearest stream or natural water-course; but if the tank be constructed across the course of a nullah, with a natural rocky bottom, it may be found cheaper and better to construct the escape across the said nullah itself.

The safest, most efficient, and, on the whole, cheapest form of calingala, supposing it constructed at or near either end of the bund, is as follows:—

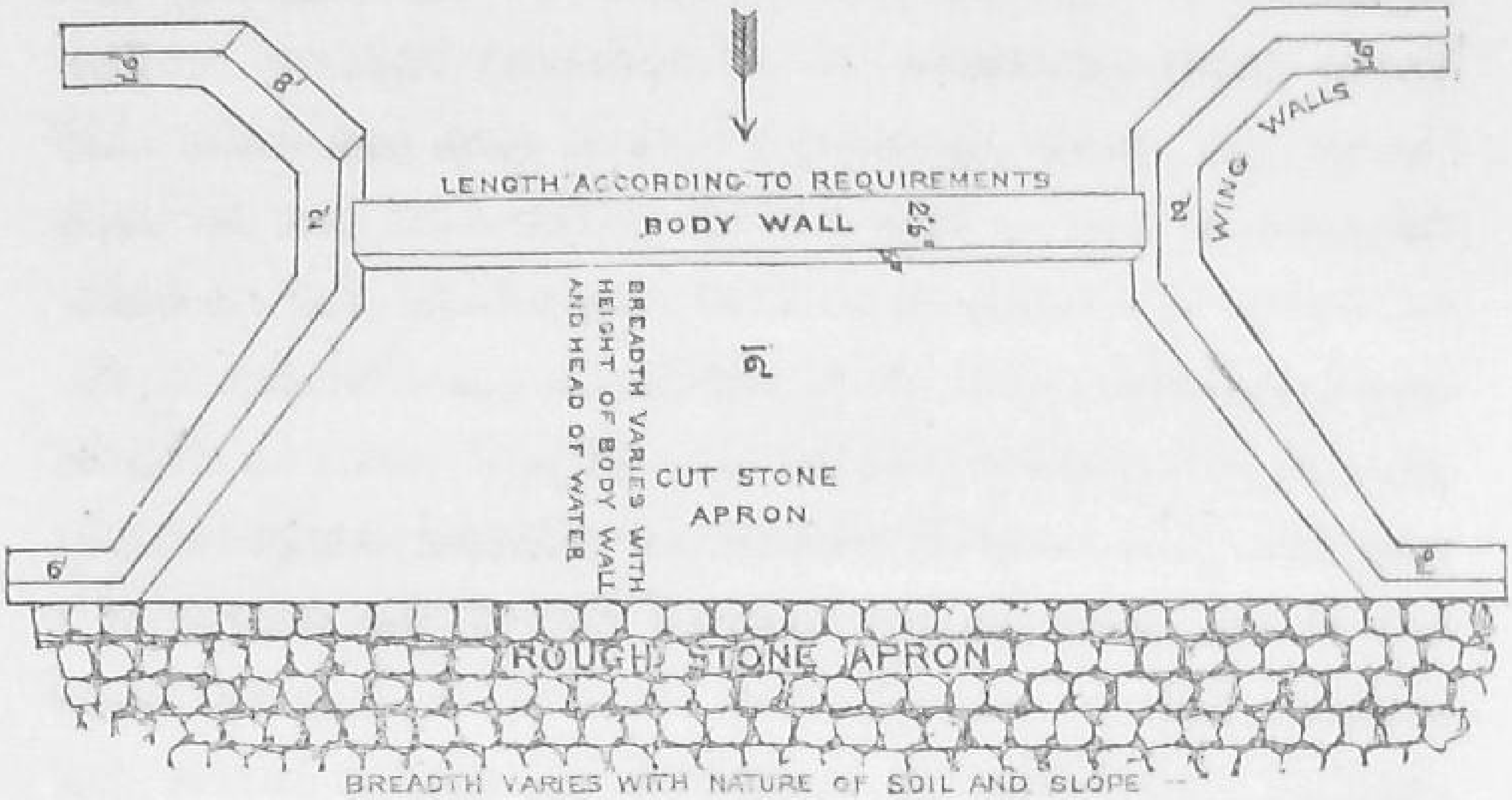
A flush body-wall, with crest level with surface of water at full tank, and long enough to discharge the required quantity at a low head, say not exceeding three feet over the crest, in the given time.

A stone apron or floor outside, and below the body wall, to receive the overfall of the discharged water; the width of this in ordinary cases should be twice the height of the body-wall above the apron, plus twice

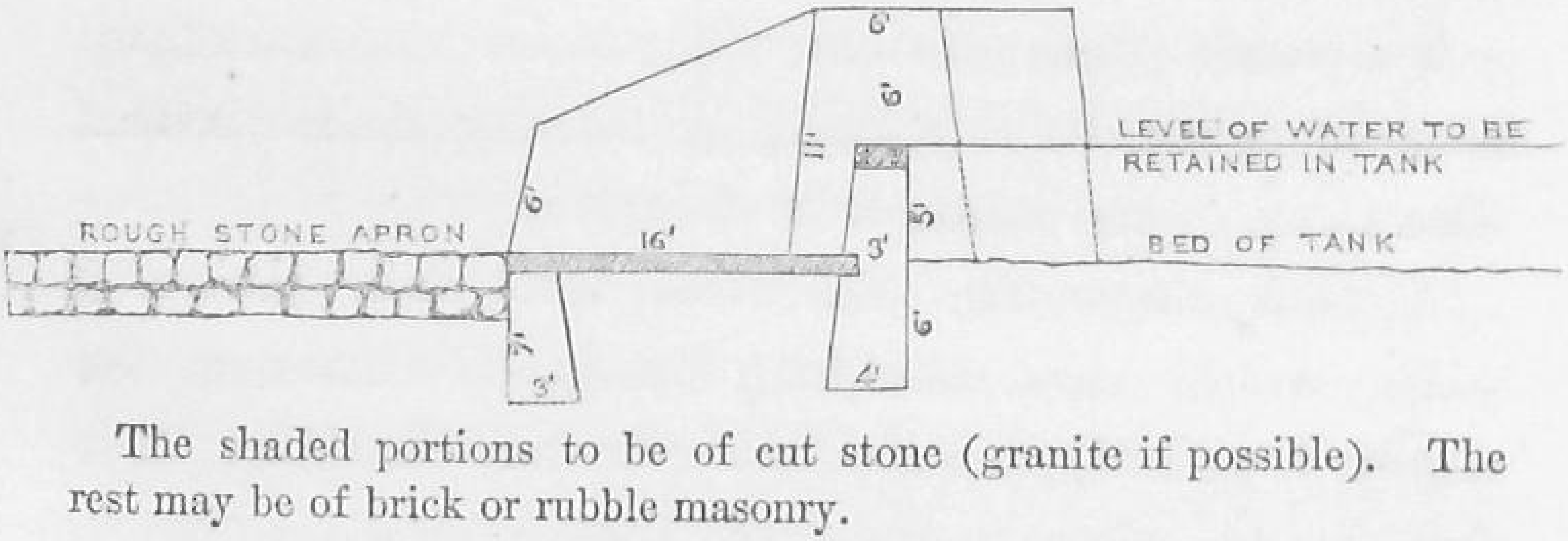
the depth of the estimated greatest head of water to be discharged. Thus, supposing body-wall five feet high above apron, and head three, the breadth of apron should be sixteen feet.

PLAN AND SECTION OF A CALINGALA, OR SURPLUS ESCAPE WEIR, FOR A TANK OR RESERVOIR, OF VERY EASY CONSTRUCTION, AND REQUIRING NO MANAGEMENT.

PLAN.



SECTION.



The shaded portions to be of cut stone (granite if possible). The rest may be of brick or rubble masonry.

A retaining wall seven to ten feet deep should support the tail of the apron.

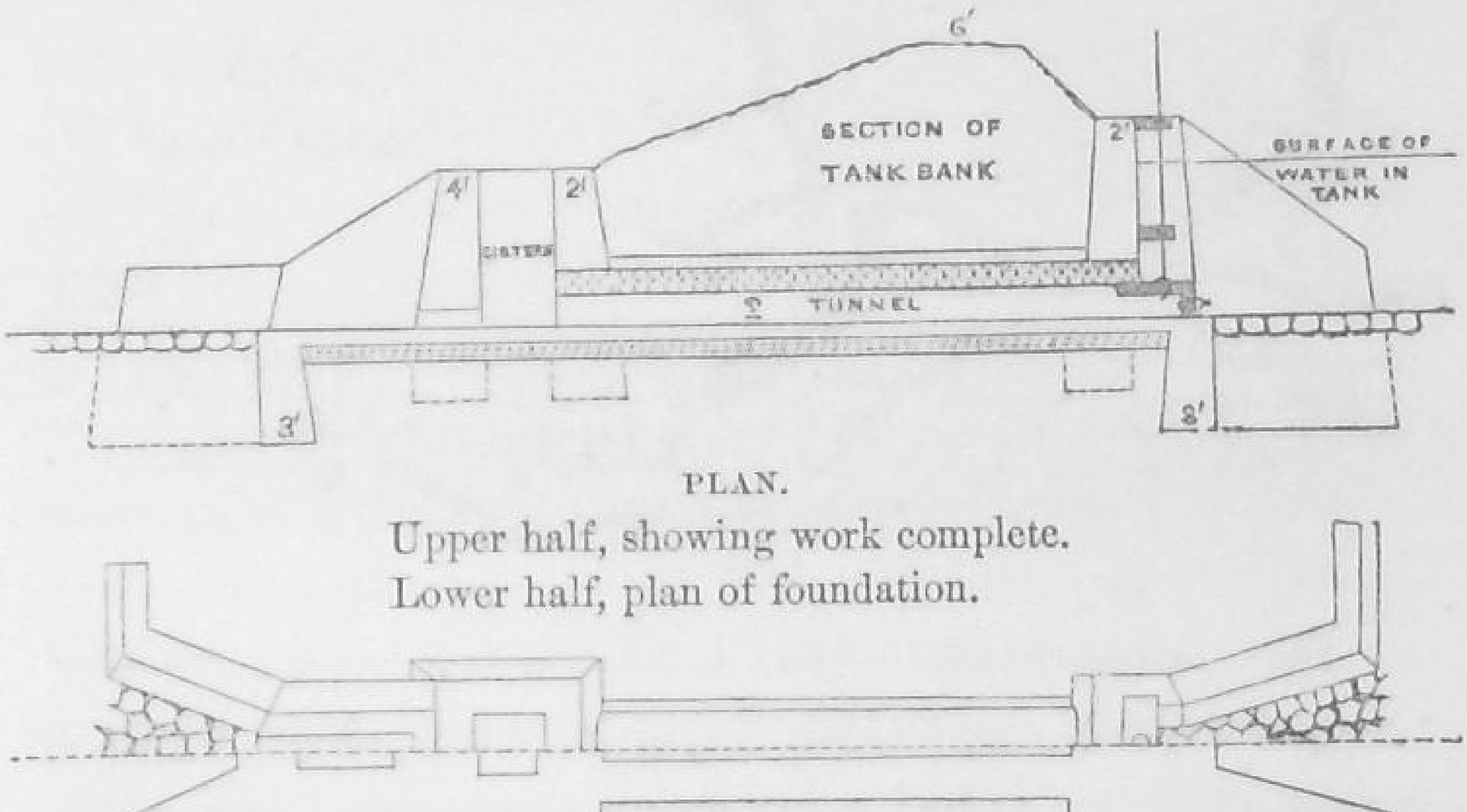
Wing walls six or seven feet higher than the crest of the body-wall must be constructed at each end

thereof, with returns embracing the embankment, and connected with the ends of the retaining wall aforesaid. The wings should splay out at an angle of about forty degrees with the body-wall, both in front and rear.

An additional apron of dry rough stone, placed behind the floor aforesaid, to prevent the water when it first leaves the said floor from scouring out holes in the earth, whereby the work might be undermined, is a great improvement.

PLAN AND SECTION OF A TANK SLUICE.

LONGITUDINAL SECTION.



PLAN.

Upper half, showing work complete.
Lower half, plan of foundation.

The head is worked by a plug attached to a pole, passing through perforated stones. The lower horizontal plug is only for use when the tank is nearly empty.

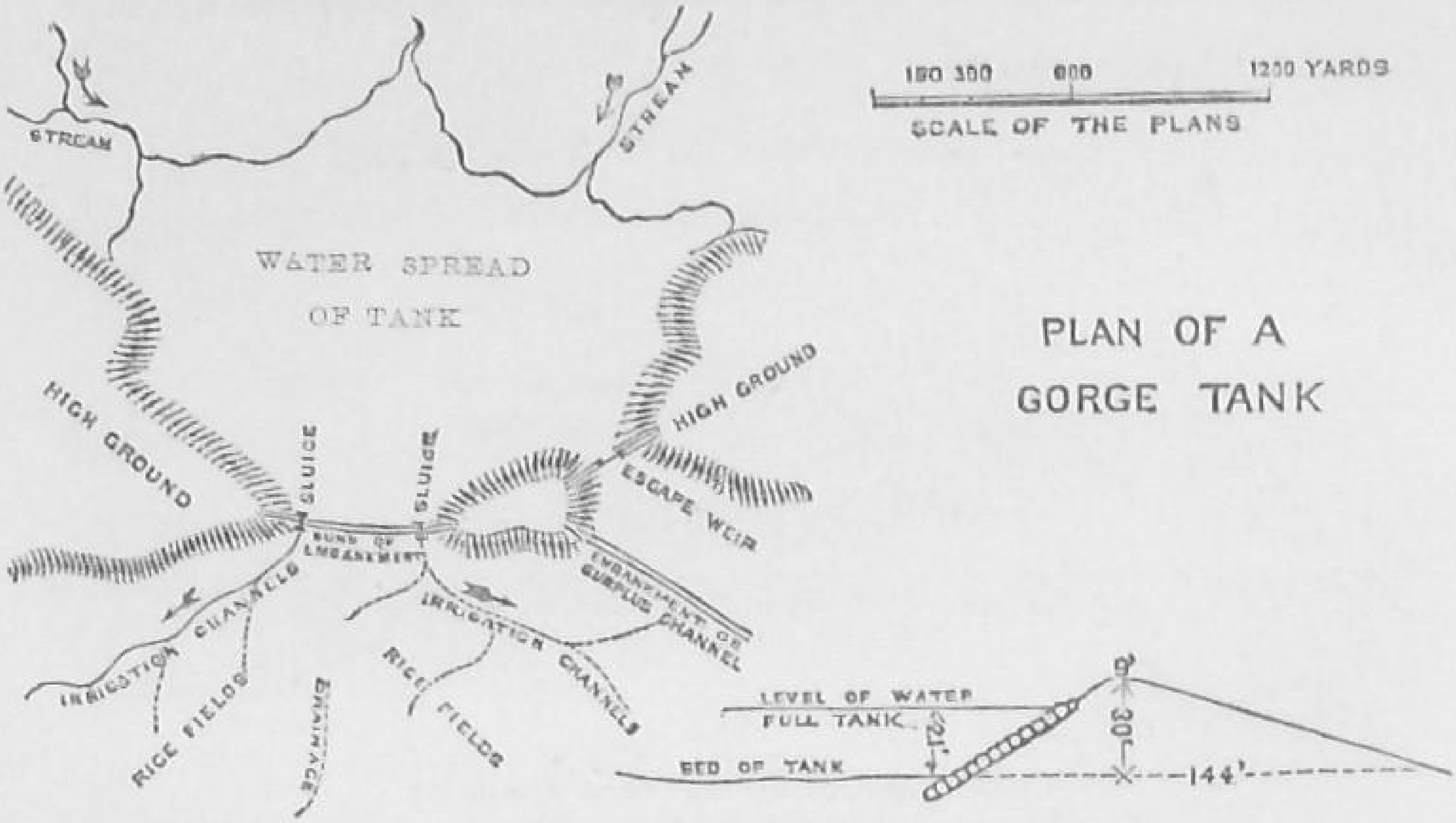
By means of the cistern, water can be delivered at different levels.

A calingala, with body-wall ten yards long, will discharge with a clear head of three feet 75,096 cubic yards, or 12,672,450 gallons of water per hour.

The tank must, of course, be provided with masonry sluices, so placed as to supply the distributing channels before described.

To give some idea of the cost of construction, two illustrations may be given.

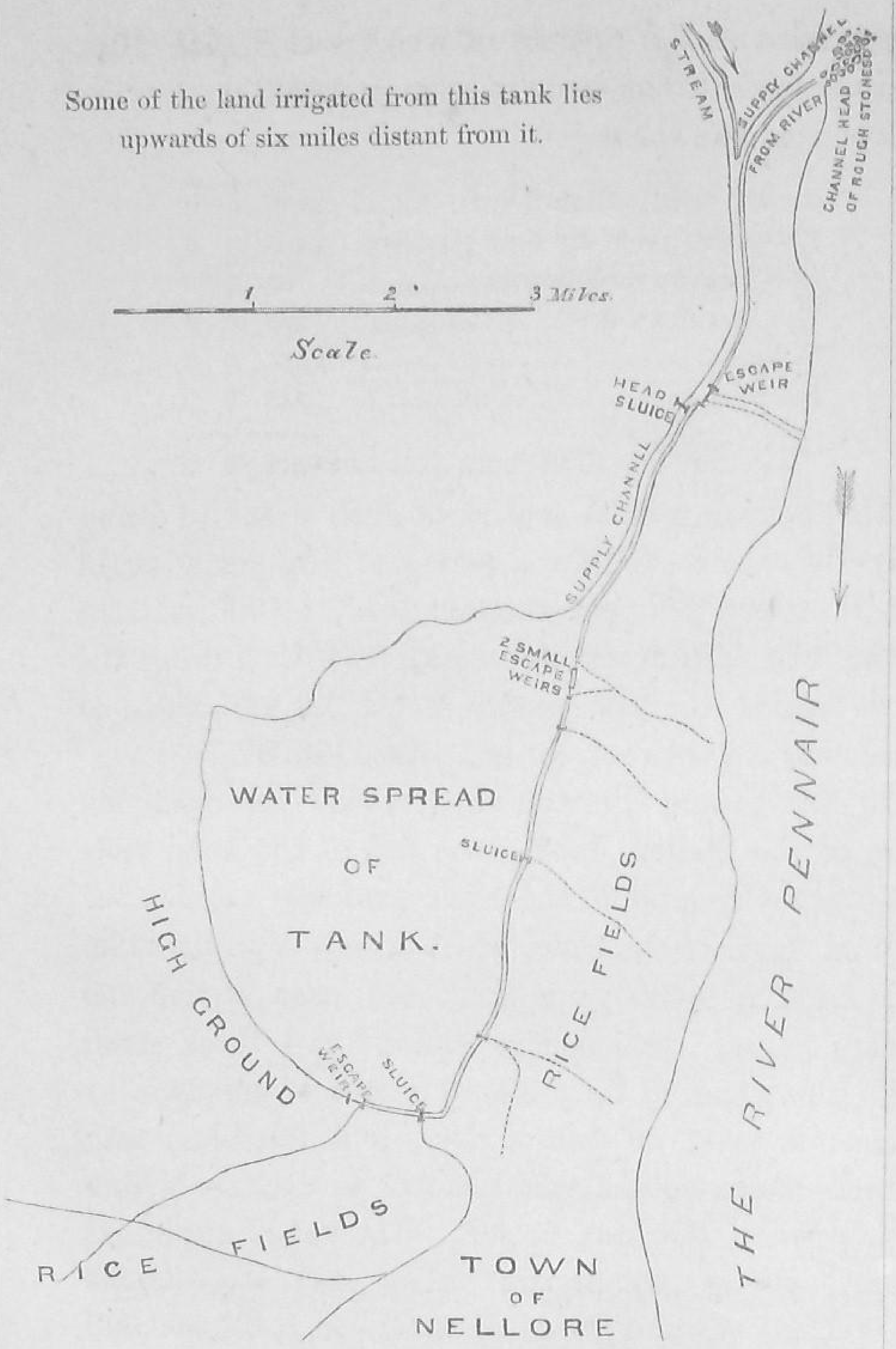
The first is of a tank constructed by closing a gorge between two rising grounds.



The embankment was 1,200 yards long, average height 9 yards, top width 3 yards, inner slope $2\frac{1}{2}$ to 1, outer $1\frac{3}{4}$ to 1. It had a dry stone revetment 1,000 yards long, and carried up to two feet above full-tank level. The rest of the bund was turfed.

It had two fine sluices and a calingala 150 yards in length. The fall of the land above the tank was 12 feet per mile; the greatest depth of water in the tank 30 feet, and its cubical contents 34,730,000 cubic yards of water. It received the drainage of 97 square miles, and sufficed for the irrigation of 3,470 acres of rice cultivation, the

Some of the land irrigated from this tank lies upwards of six miles distant from it.



PLAN OF THE NELLORE TANK,

ILLUSTRATING SUPPLY FROM A RIVER.

[To face page 65.

gross value of the product of which was 8,154*l.* 10*s.*, and net profit to the farmers, average 4,337*l.*

The cost was about—

	£	s.	d.
243,000 cubic yards earthwork	2,025	0	0
7,000 cubic yards dry stone revetment	1,400	0	0
28,800 square yards turfing	90	0	0
Two very fine sluices	280	0	0
Calingala	1,000	0	0
Sundries	245	0	0
Total	£5,040	0	0

The average annual repairs of such a tank (it being properly constructed) for a period of fifty years, ought not to exceed 30*l.* per annum; total, 1,500*l.*; making entire expenditure on the work, 6,540*l.* During the same period the net profits would be 216,850*l.*, or deducting ten per cent. for bad years, 195,165*l.*

In the second illustration (see the accompanying plan of the Nellore tank), one end of the bund rests upon a rising ground, the other gradually ascends the natural slope of the plain, which is only 4′ in the mile. The bund is 9,680 yards long, and mean section, 50 square yards. It has four sluices, and three small calingalas; and, as its principal source of supply is by a channel taken off from a river, it is furnished with a head sluice on the said channel to exclude further supply when the tank is full. Its water, spread at fullest, covers six square miles, and it contains 50,000,000 of cubic yards of water, or 8,437,500,000 gallons. As, however, it receives, thanks to the river supply, an almost continual influx during four months

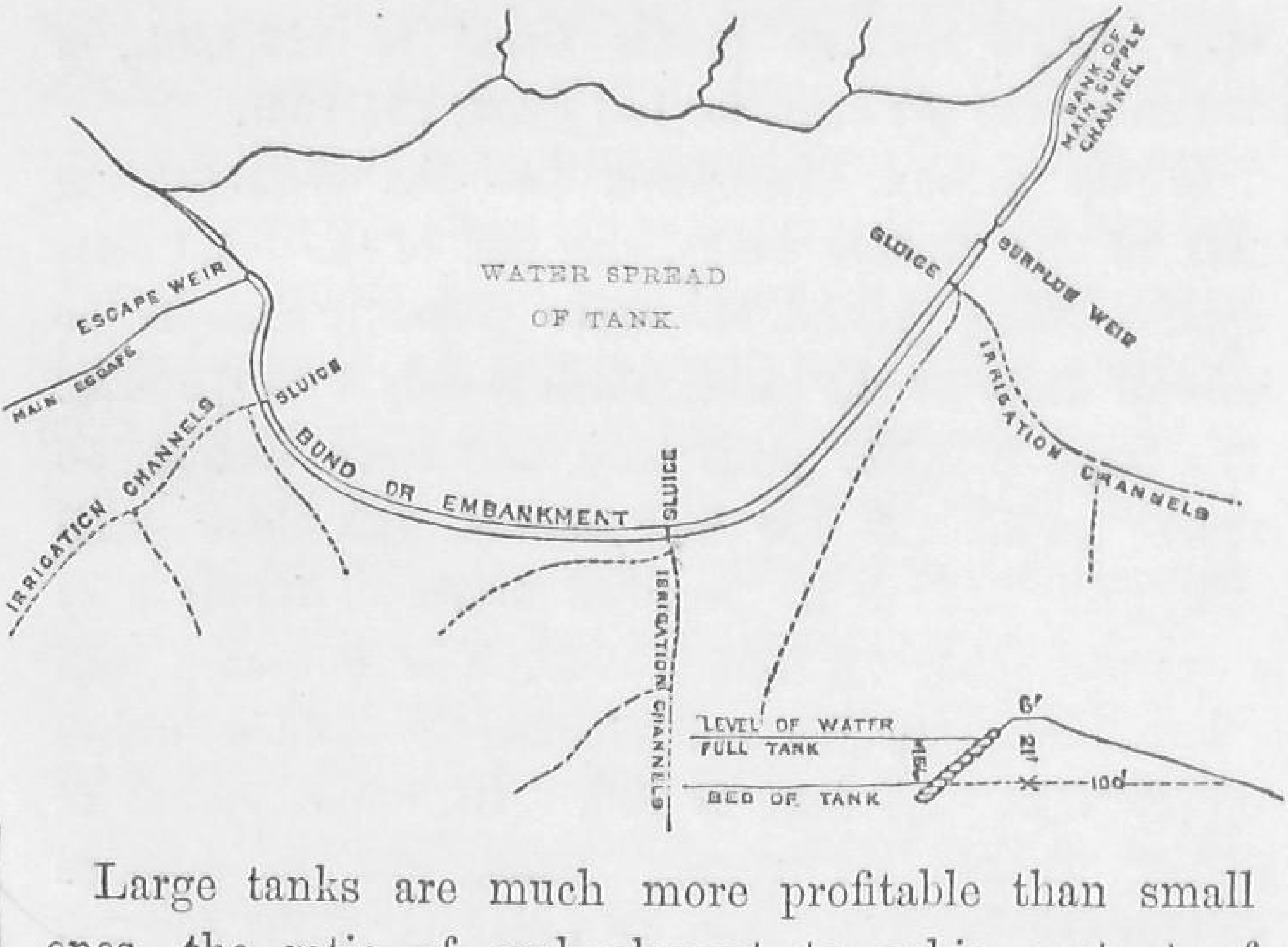
of the season, it irrigates nearly 8,000 acres, and could irrigate much more.

If a precisely similar work were to be constructed now, it might be estimated as follows:—

	£	s.	d.
484,000 cubic yards earthwork	4,033	8	0
14,080 cubic yards rough stone	2,816	0	0
Three calingalas, about	300	0	0
Four sluices	400	0	0
Head sluice	500	0	0
Turfing	726	0	0
Sundries	444	12	0
Total	£9,220	0	0

Net profit on 8,000 acres, say £10,000 per annum.

PLAN OF HORSESHOE TANK ON THE INCLINE WITHOUT BLUFFS.



Large tanks are much more profitable than small ones, the ratio of embankment to cubic content of water being less. The proportionate waste by evaporation and absorption also less, and less superficial area of

ground being occupied in proportion; but where the nature of the country will not admit of large reservoirs, the best plan is to construct a series of small ones, one under the other, and each receiving the surplus of the one above it. An estate, upon which neither of these conditions can be attained, should only be taken at a very low figure.

The principal drawback upon tanks is their tendency to become silted up. It is evident that in course of time the deposit from the drainage water that supplies the tank must fill up the bed. No arrangement of under-sluices or scouring vents can obviate this to any extent, as from the very nature of a reservoir the greater part of it must be dead water; and though under-sluices may certainly maintain deep channels through the bed, and thus prolong the term of its silting up, still to do that involves the waste of a great deal of water, which, in the majority of cases, cannot be spared. Where a certain and ample supply can be commanded, or where the water wasted from an upper tank can be utilized below, it may be a good economy to construct under-sluices or scouring vents in the embankment.

It is, however, remarkable that the process of silting up is very much slower in practice than it should be by theory. It is very rarely that a tank has to be abandoned on this account. Tanks, known to have existed for centuries, are still in thoroughly serviceable condition.

In the first place, such portions of the tank bed as are lower than the sluice sills may be filled with silt without detriment to the tank.

The excavations within the bed, whence the earth was taken for the bund, also serve as slush-pits, and collect the silt; and while the tank is full, at which time the greatest amount of earthy matter is in suspension in the water, the sluices are in full action, and the water rushing through them under the pressure of a head of many feet, carries with it an immense quantity of deposit into the fields to their very great benefit.

Thus the prospect of a tank becoming useless by silting up, is an evil which its constructor need never take into consideration as likely to happen within his own lifetime.

As to breaches, they only occur either from false construction, from neglect, or from mischief. A tank bund has no more right to breach than a locomotive to blow up. Construct it efficiently in the first instance, provide it with adequate safety valves, and protect it from the injuries of vermin, insects, &c., and you need never fear its giving way under the mere pressure of water or wash of waves.

With respect to the drainage of an estate in India, the rules are very simple. Superficial drainage is usually all that is required; sub-soil drainage being nearly always useless, and often positively injurious, the evaporation during the dry season being so great.

It must be kept in remembrance that the rain is often a regular deluge, and that you must provide for the escape of water in floods, not in driblets; therefore the main drainage should be of adequate capacity, and free communication with it secured to all parts of the estate.

The fields may at any time be relieved by a spade-cut in the vurrapoos, or small earth-banks that surround them, and a good outfall must be secured. This, of course, is easy enough if the inclination of the ground be considerable, and if there be a deep channel or river-bed near at hand to receive the discharge; but in delta lands, or anywhere on a flat plain, or where the estate is but little above tide-water, the drainages must be made very wide to compensate for their lack of depth and velocity.

Wherever baling is required, whether to drain hollows or to irrigate land too high to be commanded from the tank or channel, and where the interest concerned is not sufficient to justify the erection of a steam-engine or windmill, the Archimedean or Roman screw, worked by manual labour, will be found the most efficient and economical implement.

The natives bale sometimes by the Dutch spoon or shovel, sometimes by hand-baskets swung by cords between two men, sometimes by picottahs. These are formed of the trunks of palmyra trees hollowed out, which work on a pivot at the centre of their length, the large end in its depression dipping into the water to be raised, and when lifted, bringing up three or four gallons at a time, which runs out from the small end on to the field. Two posts are set up, one on each side of the centre pivot, between the tops of which a long spar is suspended parallel to the trough, one end connected with the large end of the trough by a rope or bamboo, the other loaded with a stone, so as to equi-

poise the weight. One or more men walk backwards and forwards on this spar, alternately raising and depressing each end. Sometimes it is worked by cords from below. It is certainly a very cheap machine, but the water raised is much less in proportion to the labour employed than is the case with the Roman screw.

In Travancore, Dutch wheels are used for baling; these resemble the paddles of a steamboat, working in an inverted paddle-box of quadrant shape, the vertical radius of the quadrant dipping into the reservoir, the horizontal side leading to a trough through which the water driven up the arc of the quadrant by the float-boards is discharged upon the field. A bamboo scaffolding is erected about the wheel (which is from twelve to twenty feet diameter) to serve as a hand-grip for the labourers, who drive the wheel by stepping on the float-boards like a treadmill.

The device is superior to the picottah, but the machine is of more expensive construction, and its ratio of work to labour, much inferior to that of the Roman screw.

A screw twelve feet long will command a clear lift of four feet with full efficiency, a lift which would require two picottahs one above the other, or a wheel of eighteen feet diameter.

A screw twelve feet long and twenty inches interior diameter, usually takes six coolies to work it for twelve hours; two men *can* work it, but they generally take it three at a time.

At least a dozen men would be required to work the Travancore wheel at the same lift.

CHAPTER VII.

DRY FARMING.

DRY farming, in the nomenclature of the Indian ryot, includes all such crops as are raised without *artificial* irrigation, and dependent solely upon rainfall. Among these may be classed an inferior sort of rice, yielding a scanty and precarious crop;—all varieties of oil-seeds, linseed, castor, gingely, sesamum, &c.; all dry grains, as wheat, barley, jowarree, maize, millet, ragi, and the like; all vetches, dhall, grain, peas, &c.; and also indigo and cotton, both of which were often reared by the natives without artificial irrigation. But in the present day, the term might be better taken to include all crops which benefit by partial or occasional irrigation, but do not require so large or continuous a supply of water as is indispensible to the crops already classed as wet. In this sense tobacco, chillies, turmeric, garden cultivation in general will come under the head of dry cultivation, as also cotton and indigo as cultivated under the improved system which involves partial irrigation. If these crops are raised under channel irrigation, the

requirement of water may be estimated at two-fifths that for rice; or if as usual under tanks at one-half. The small difference is due to the greater proportional evaporation from the surface of the tank during the prolonged period for which its surfaces are required.

Dry grains, &c. are frequently raised upon the alluvial tracts of deltas as a second crop during the dry season, after a first crop of rice has been reaped; and if the land is good and the supply of water sufficient, the profits are very large. A pooty of land (eight acres) in the Tanaku talook, Godavery district, gave results as follows:—

First crop.—Transplanted rice sown in June and reaped in the end of December:

	£	s.	d.
Value of crop, including straw	18	0	0
Deduct cost of cultivation	4	0	0
	£14	0	0

Second crop.—Chunna or Bengal gram sown in January:

	£	s.	d.
Value of crop	15	0	0
Deduct cost of cultivation	3	10	0
	£11	10	0

	£	s.	d.
Total net value of crops	25	10	0
Deduct rent and water rate	5	0	0
Net profit	£20	10	0

On an outlay of £12 10*s.*

This was of course on good land, thoroughly well watered and drained.

The average yield per acre of some of the commonest dry crops was found to be as follows :—

Black rice, dependent on rain alone..........	700 lbs. per acre.
Bengal gram, or chunna	450 ,, ,,
Madras gram, or coolty..................................	600 ,, ,,
Dhall	500 ,, ,,
Cotton, unirrigated	200 ,, ,,
Indigo, unirrigated, of dry indigo.....30 to	50 ,, ,,
Wheat, partially watered ....25 to	30 bushels ,,

The annual value of an acre of red chillies, during a period of five years in the Godavery district, was found to average 8*l.*, cost of cultivation being about 2*l.* 3*s.*; but for this partial irrigation was always requisite.

Indigo is a somewhat uncertain and unsafe crop. The plant is a biennial. It requires a smooth rich soil, not too dry, and is planted in rows about a foot apart. Shallow furrows, about four inches deep, form a cheaper method of culture than the hoe system.

The plants in favourable (damp) weather, or if lightly irrigated, make their appearance above ground in four or five days, and ripen in about two months and a half. Great care should be taken to weed the plantation thoroughly, and to keep the ground *moist*, but not *too* wet.

When the plants are beginning to flower, they should be pruned, as by their flowering the crop is greatly impoverished. They may be cut again and again at intervals of about a month.

The leaves should not be gathered after heavy rain, as it will have washed off from them the farina which

constitutes their principal value. At the same time the pruning should not be done upon a hot dry day, as it may possibly kill the plant—cloudy weather is the best for the purpose.

When the leaves are gathered, which should be effected with great care, so as not to waste the farina, they are thrown into a steeping vat, there to remain until fermentation takes place,—this will be sooner or later according to the heat of the weather, but never longer than twenty-four hours. This first fermentation must not be allowed to go on too long, but as soon as the liquid becomes of a lighter colour and the feculent particles show a tendency to precipitate, the water should be run out into another vat, where it is stirred to separate the useless salts of the plant from the subtile earthy matter which constitutes the indigo.

This operation is the crisis of the manufacture, and requires great judgment as well as care; for if the stirring is insufficient, the salts are not separated, while if it is excessive, a second fermentation takes place and the colour is deteriorated.

As soon as the coloured particles are observed to begin to separate, the agitation of the fluid should be stopped, when the blue dregs will precipitate to the bottom of the vat, leaving the water above quite clear, which should then be slowly and quietly drawn off.

The deposit in the vat will be a thick muddy semi-fluid; it is put into sacks, and when no more moisture can be drained off through the cloth, the mass is transferred to flat shallow boxes or troughs to dry. After

a few days it should be cut across into dice, about an inch square, to facilitate the process of drying. As soon as the said drying is complete, the indigo should be packed up for transport, care being taken to exclude the air from it as much as possible.

The best indigo is of a dark violet blue colour, bright and metallic looking when fractured, and rather lighter than water, in which if pure it will dissolve and mingle equally.

The native labourers, if not carefully watched, will fill the steeping-vats with stalks as well as leaves, to save themselves trouble and increase the tale of their work, if they are paid at per so many baskets. This is worse than wastefulness, for it injures the dye.

A great deal depends on the gathering of the leaves,—whether they have arrived at that state of crispness that indicates maturity,—whether they are covered with farina or have recently been washed in a shower,—whether they are carefully gathered or the farina wasted by rough handling. It depends on the observance or non-observance of these conditions whether 200 or 300 pounds weight of leaves will be required to make one pound of indigo.

The native growers allege the yield to be from thirty to fifty pounds of dry indigo per acre, but under favourable circumstances, and with proper management, this return may be considerably exceeded.

Hemp is frequently grown as an alternating crop during the dry season, upon land which has been irrigated during the wet. It is said by the natives to

improve the ground. It yields about 460 lbs. of marketable hemp to the acre. An intoxicating drug called Bhang or Ganja (Haschish) is also prepared from the stalks and leaves of the hemp plant (Cannabis sativa), and is, I am sorry to say, in great demand among the lower orders of natives.

Cotton as an article of cultivation in India is, under present circumstances, a matter of such importance as to have deserved and obtained a special illustration in a work exclusively devoted to itself, and for all particulars connected with its production, it is sufficient to refer to the work lately published by Mr. Wheeler.

With regard to the objects of the present publication, it will be sufficient if we consider the question whether cotton is likely to become a good speculation for the British planter in India, whether it is worth while for an Englishman to undertake cotton cultivation on a large scale; or whether the return it would offer to outlay might be expected to be so small and precarious as to render it more prudent to leave the task as at present, to the desultory efforts of the natives.

The whole thing is, of course, a question of price; will it pay? Not only will it pay some profit on the outlay, but will pay as high a profit as might be obtained by other cultivation on the same ground, and under the same conditions. This was the question which deterred the natives from rushing into cotton cultivation at the rate they were expected to have done under the inducement of the present abnormal demand. The natives in their characteristic timidity, thought the luck too good

to last; they knew that at the old prices it was not worth their while to take the Manchester market much into consideration; they could get more out of their land under most circumstances by other crops, and they consequently only cultivated cotton for home (that is, Indian) consumption, or upon land which would grow nothing else. Their crops were, as a natural consequence, inferior both in amount and quality, and so much thereof as did find its way to England was much contemned, and a notion arose that Indian cotton was necessarily of a very poor description. This, it is true, does not now appear to be the fact. Specimens of the very best varieties grown in India by gentlemen for their own amusement, have been admitted to be fully equal to any American produce, and it is the general belief in India that had the experiments conducted by order of the late Court of Directors had fair play, their results would have been far more favourable than they were.

But increased yield and improved staple involve the need of more costly cultivation, and taking into consideration the length of the sea voyage, it is alleged to be certain that with every advantage of railway and river navigation for inland transport, India could not compete with America at the old prices, supposing the Southern States ever able to revert to work on the old terms.

Now the cost of cultivation, and the yield, under the native system, upon the eastern coast were recently as follows:—

One instance gave,

EXPENDITURE.

	£	s.	d.
Land tax and water	0	6	0
Ploughing	0	4	0
Cleaning, seed, &c.	0	4	0
Total	£0	14	0

RETURN.

	£	s.	d.
Four maunds, sold for	1	16	0

Net profit, £1 2*s*., or 150 per cent. on the outlay.

Another instance gave

EXPENDITURE.

	£	s.	d.
Land tax and water	0	8	0
Ploughing	0	4	0
Cleaning, seed, &c.	0	4	0
Total	£0	16	0

RETURN.

	£	s.	d.
Four and a half maunds, value about	2	0	0

Net profit, £1 4*s*., or 150 per cent.

These instances were taken previous to the American war; the cotton in both cases was sold for native consumption, not for exportation, and the average market price at the time was about 4½*d*. a pound in the country.

An instance in Orissa gave for total outlay 12*s*. 1½*d*., and yielded, per acre, four maunds and ten seers, valued at 2*l*.; net profit being 1*l*. 7*s*. 10½*d*., or 229 per cent. on the outlay.

To have carried the produce of the foregoing instances to the nearest port, would have added about three-far-

things a pound to the cost, they being only accessible by native routes.

Supposing the railway completed, or the Godavery opened for navigation, cotton could be brought from the heart of Berar to Bombay for about the same sum, viz., three-farthings a pound, and to Cocanada for rather less than a halfpenny. Taking the cost at Cocanada to be 5*d.* the pound, and freight at 5*l.* per ton, the actual cost at Liverpool would be rather more than 5½*d.*, call it 5¾d. per pound.

The yield per acre of cotton, as cultivated by the natives according to those instances which have come within my own observation, is from 100 to 250 lbs. of cleaned cotton. Under an improved system the yield would doubtless be greatly increased, as well as the quality rendered better; and thus, although the data given above as costs of native culture cannot be expected to cover the expenses of cultivation as it would be carried on by Europeans, the ratio of return to outlay might be expected to continue pretty nearly the same.

Assuming the expenses to amount to 30*s.* per acre, and the yield to be 300 lbs.; this, at threepence per pound, would give a profit of 150 per cent. on the outlay.

The produce might be landed at Liverpool at from fourpence to fourpence halfpenny per pound.

In this calculation the freight has been assumed above the average, the cost of transport on the Godavery considerably higher than it will probably be in reality, and the grower's profit taken very great. On

the other hand, interest on first outlay for plant, or depreciation of machinery, have not been taken into consideration; such an item, to include only what is absolutely necessary, would, however, not be a very heavy one.

Should the above data therefore be true, or even near the truth, and I see no reason to doubt them, it would appear that cotton cultivation might be carried on with a very reasonable prospect of success by Europeans in India, in the financial point of view, and that even when the American market is reopened. The one indispensable condition, however, is improved inland transport. Under the old system of bullock carriage, or even on good roads by common carts, it would be impracticable, the cost of transport would swallow up everything. But with the aid of the railroad, and still more, with that of the water communication, both now in progress, this difficulty will be got over. The other objections to East Indian cotton, its foulness, wastefulness, &c., are easily obviated by a little more care in cleaning and packing, and perhaps a little more honesty in the agents. The alleged inferior quality may doubtless be rectified by improved cultivation; for if a gentleman in India can grow Sea Island cotton equal to any in his own garden, it is at any rate a proof that there is nothing in that climate and that soil insuperably hostile to the plant.

CHAPTER VIII.

HILL FARMING.

When an Englishman turns his attention to the subject of Indian farming as a possible means of earning a livelihood for himself or his son, his thoughts are usually limited to the hill tracts, which seem hitherto to have been regarded by general consent as the best, or almost the only localities suited for European enterprise in the Peninsula.

Although, as may have been inferred from our previous remarks, this is by no means the fact, it is nevertheless true that the hill tracts do possess some, and indeed, important advantages over the plain country.

An Englishman feels more bodily energy and vigour in these elevated regions. Labour is found to be less exhausting. Native competition, at present, is not so great—in some parts, indeed, does not even exist. The rent or price of land is consequently much lower, and grants much more easily obtained. Many varieties of produce peculiarly adapted for the European market, thrive better there than anywhere else, and taken as a whole (though not without some drawbacks), the

climate is more congenial to European constitutions.

The special disadvantages, moreover, of such localities, such as remoteness from markets, difficulty of access, want of water communication and of good roads, scarcity of labour, and so forth, are, for the most part, remediable. Measures for great improvements are already in progress, and others are looming in the not very remote distance.

Great care and foresight are, however, requisite in selecting a site before sinking capital in the purchase of an estate on the hills.

If intended for a permanent settlement—an abode as well as a farm, which, by the way, is the condition under which farms are most profitable—it must be well above "fever level." There are, it is true, very fertile tracts on the lower spurs of the mountains, admirably adapted to produce magnificent crops of coffee and pepper, and the most, if not the only suitable spots for vanilla, cardamoms, and spices in general; but in these places, European residence is only possible during a few months of the year: during the rest, the plantations must be left entirely to native superintendence, and even the natives dislike such localities, and suffer severely from fever. They can only be induced to remain by the temptation of high gains, to be acquired honestly or otherwise, as the case may be; and even then are very apt to neglect their charge and run away on the first panic.

The fever level varies very much in different parts of the hills; but as a general rule, we may assume that

the elevated plateaus, from 3,000 feet and upwards above the sea-level, are tolerably free from fever, though it will not do to suppose one's self so safe there as to be able to take liberties with one's constitution—a mistake too frequently committed. If a man will expose himself to the sun's direct rays, unscreened, or will get himself wet through, and then sit in his wet clothes, or will sleep exposed to the night dews, or in damp hollows, or in the midst of dense vegetation, or will neglect to keep himself and his house sweet and clean, he may find fever 6,000 feet above the sea, as well as at any lower level.

Take care that your estate does not lie in a hole. Basins among the hills are very objectionable, even when they have an outlet; but when they have none, they are ponds during half the year, and swamps for the remainder. Even when you get a good plateau it is desirable that it should not be screened from the prevailing winds by hills too lofty or too near at hand. You will, of course, secure a good out-fall for your drainage, and you must also be particular as to your supply of drinking-water, not only as to its not running short in the dry season, but also as to its quality, which varies very much in different places. The natives lay even greater stress on the goodness of the water than of the air, as a condition of health, and experience confirms their views on this subject. Take care that you have a sufficient depth of soil: very tempting-looking spots often have but a few inches of good earth over a surface of solid rock.

When you have got your land, clear it of underwood, weeds, and the long coarse grasses; burn them down in the dry season, and then plough up the roots, drain all hollows and plashy spots, concentrate your water for irrigation in one large reservoir, if practicable. Thin, but do not exterminate, your large trees, retaining a sufficient number to break the force of the violent east winds, without excluding them entirely. Many farms have been seriously impaired by the too reckless destruction of trees, especially where coffee was the principal crop. Provide for yourself a good substantial house in a dry situation, and hut your labourers comfortably; it is money well laid out. Native coolies, if left to their own devices, will, from motives of economy, pig together in a way quite irreconcilable with health. You will get double the work out of them if you provide them with decent quarters, and will almost save the outlay in the reduced expenditure on quinine. It is also desirable for the same reasons to provide them with wholesome food. You can establish a bazar for them, getting your supplies wholesale, and feed them well at a less cost than they could feed themselves for, very indifferently, by their own individual arrangements; or than would be charged by a speculative dealer, who might be tempted to come up by the hope of high profits.

A gentleman of my acquaintance who had a hill farm, found he could advantageously employ a permanent establishment of fifty labourers. He built a range of huts for them at sixteen shillings a hut, having his timber and bamboos for the mere cutting. He built a

store, and kept a store-keeper at two pounds a month, purchased rice, curry stuff, &c. wholesale in the plains, brought it to his store, and issued daily rations to his coolies. He gave each labourer two cumblies or coarse native blankets per annum, and sixpence a day money wages in addition. The lodging, rations, and blankets being given them free of charge. He succeeded in obtaining the requisite number of labourers on these terms, in spite of a strong prejudice against the site—a newly opened part of the country—which has, however, turned out very well.

The cost of his experiment may be thus stated:—

	£	s.	d.
Twenty per cent. on £84, prime cost of huts and store	16	16	0
Wages of storekeeper for one year	24	0	0
Cost of rations, including carriage, per annum	336	10	0
Money wages for the year	456	5	0
One hundred cumblies	12	10	0
Total	£846	1	0

Being a fraction of a farthing more than elevenpence per man per diem. Even allowing for temporary loss of service by sickness, the cost was under a shilling a head, for his men were remarkably healthy, and they were also well contented with their condition, and he had only one deserter in two years.

Of the crops which may be successfully cultivated on the hills, the favourite has hitherto been coffee. This is of sufficient importance to call for special notice, with a few details of the method of cultivation.

The coffee-plant thrives well, both upon the hills, when not too much exposed, and on the lower spurs and slopes. To prepare the ground for its cultivation, all underwood and weeds must be exterminated, but a sufficient number of the larger trees retained to afford shelter to the plants, without entirely excluding the sun and wind.

The plants should be eight or nine feet apart, and set in holes about a foot or eighteen inches deep. They will grow to sixteen or twenty feet high, but should be cut down to five or six feet, when they will spread out and become very full.

They begin to yield in the third year, and are in full bearing in the fifth. Under favourable circumstances they will last thirty years.

The flowers are pure white, and grow in clusters at the root of the leaves. The fruit is like a cherry, and when ripe of a deep red colour.

The berries should be allowed to fully ripen on the tree, so as to fall when shaken. Their outer skins are then shrivelled, and come off more easily, and the quality is believed to be better than when gathered at an earlier stage.

The roots of the plants should be well drained, the ground kept clean, and caterpillars and other insects carefully removed.

When the berries are gathered they are taken to the mill, which consists usually of three rollers, two moveable, one fixed. They are of wood, covered with iron, and are from eighteen to twenty-four inches long, and

about ten or twelve inches in diameter. Above the rollers is a hopper, in which the berries are placed. They thus fall between the moveable and fixed rollers, where they are stripped of their outer skin and split into what are called coffee-beans. They then pass into a sieve beneath the rollers, which sifts the skins and discharges the beans into baskets.

The beans are then soaked in water for one night, washed, and well dried; they are then placed in the peeling mill, a wooden grinder, revolving vertically, where they are divested of their second skin; they are then winnowed, picked, and sorted, and when thoroughly dry, packed up for market.

Coffee is an exhausting crop, and if a little more attention were paid to manuring the roots occasionally, than has hitherto been the practice, the yield would be greatly increased.

Tea has been introduced upon the Hill tracts of Southern India so very recently that little can be said upon the subject, except that such few reports as have been received are decidedly favourable.

As far as can be judged, prior to the test of long-continued trial, our southern hills appear to offer conditions of success to tea cultivation, at least equal to those of Assam, while their climate is generally believed to be more salubrious.

Cinchona and Vanilla are also of quite recent introduction; the reports upon the former have been very favourable; it thrives upon the hills and lofty plateaus.

Vanilla can be cultivated successfully on the lower

spurs, or even upon the plains bordering upon the back-waters of the western coast; it does not appear to thrive upon the higher levels where the night air is too cold, and either kills the plants or hinders their productiveness.

Wheat, barley, and potatoes, thrive very well upon the hills; there is a great demand for potatoes, and the gross value of the produce of an acre averages about 8*l.* per annum.

Apples, pears, and most of the European vegetables, can also be successfully raised upon the hills, and now that the railways promise a rapid means of transport to market, kitchen-garden produce bids fair to be a very profitable speculation.

Cardamoms and pepper grow luxuriantly on the lower spurs, but the business is almost entirely in the hands of the natives.

The cardamom thrives best in the lower, moister, and more sheltered parts, which are, of course, the most unhealthy. Their chief locality, the celebrated Cardamom Hills of Travancore, is so deadly, that the cultivation is carried on only by a particular class of natives, who do not permanently inhabit the tract, but make periodical visits to it during the less unhealthy season of the year. It is almost impossible to get any others to go there at all, and their objection must be admitted to be not without foundation; since of a surveying party sent into the district by the Travancore Government, only one man is said to have survived.

The black pepper grows plentifully on the slopes of

the lower spurs of the hills on the western side of the chain of mountains, usually called the Western Ghauts, from Cape Cormorin to the Nerbudda. The plant is a creeper, and clings to the stems of the forest trees, whose shade, as well as support, is essential to its welfare.

Cinnamon, cloves, nutmegs, and other spices, will also grow well upon the western coast and lower spurs of the hills. I have seen very fine specimens flourishing and bearing well in private gardens, but have had no opportunity of observing them in plantations where cultivated for profit, and thus have obtained no satisfactory data as to their culture and profitableness. The natives have paid but little attention to them, and I am under the impression that they require more care, outlay, and patience, in awaiting a return, than it has hitherto suited the native farmers to give them; there is certainly nothing in the soil or climate to hinder their successful cultivation.

The areca palm, which requires but little care or cost, is largely cultivated by the natives, especially on the western coast, where it is more productive than anywhere else. It is a tall, slender, graceful tree, like an attenuated cocoa-nut palm, the stem perfectly straight, and the fruit growing in clusters at the root of the leaves. It is the nut (incorrectly termed Betel nut, by Europeans) which is chewed by the natives as sailors chew tobacco.

The term Betel properly applies to the leaf, which is masticated with it, which is the produce of the creeping

plant, the Piper Betel. This is also extensively cultivated by the natives in large gardens; the plants are supported by poles, and at a little distance have somewhat the appearance of a field of hops. The demand for these productions is, I believe, almost entirely limited to the natives themselves; a piece of the nut, with a clove or two, and perhaps a bit of tobacco, is wrapped up in one of the leaves, previously smeared with fine lime, to form the quid, which is chewed by young and old, men and women, great and small; the leaf is called pan in Hindustani, and pak in Tamil; the effects of the quid are astringent, and are said to strengthen the gums and preserve the teeth, which, however, by its continued use, become quite black.

If the hill farmer should chance to have a few rupees to spare, I do not know that he could make a better or more public-spirited use of them than by following the advice of the Laird of Dumbiedikes, and whenever he has "naething else to do, be aye sticking in a tree." The outlay would be very trifling, and on almost every hill farm there are sure to be some odd nooks and corners where trees would grow, but which cannot be turned to profitable account for other things.

It has been already mentioned, moreover, that the coffee-plant requires shade, and thus an exposed, bare plain, *thinly* planted with fruit and timber-trees of the most useful kinds, would be in process of preparation for coffee cultivation, by a means which would eventually itself insure a handsome additional return.

Teak, the most valuable of all Indian timber, is

getting scarcer and dearer every year; the reckless way in which the natives cut down the young trees, previous to the recent forest regulations (which have come almost too late to be of much use), and their entirely neglecting the duty of planting, has been the cause of this; the demand at the same time having enormously increased, both for ship-building and for all other purposes.

The supply at present comes partly from Burmah and the Tenasserim provinces, partly from the forests on the Godavery and Mahanuddy, and partly from the Western Ghauts. The difference in quality is considerable. The Burmah or Moulmein teak is the lightest, averaging about forty-six pounds to the cubic foot; it also furnishes the largest scantlings in every dimension, and is most free from knots. It is, however, softer and less durable, and the larger logs are apt to be defective in the heart.

The Godavery teak is harder and heavier, about fifty pounds per cubic foot; it is more durable, and decidedly preferable for ornamental work, being prettily grained, and taking a high polish; the logs, however, are often gnarled and crooked, the wood much more full of knots, and pieces of large scantling can seldom be obtained.

The teak of the Western Ghauts appears to occupy a middle position between the other two in every respect, and is probably for general purposes the best timber.

This last is the description which should be cultivated on the hills, where it grows to its highest perfection.

Two or three years ago, the price of Western Ghauts

teak at Alleppy was about three shillings per cubic foot. And of Moulmein teak at Madras, from three and sixpence to four shillings.

There is plenty of teak still to be found growing wild in the recesses of the hills, but it is all but useless from the difficulty of getting it to market; what is wanted is a good supply in tolerably accessible places, and there seems to be no reason why this should not be secured. There are plenty of such localities available, and a description of one will pretty well serve for all.

I will take the Kulledyaur or Pattanapuram river, in Travancore, for an example; for twenty miles above Pattanapuram, this river runs through the lower spurs of the Western Ghauts, and the said spurs afford an admirable site for the growth of timber trees, while their steep slopes enable the logs to be taken down to the river on rollers with comparative ease. Supposing an acre of this land planted with young teak trees now, it would yield, thirty years hence, at the very lowest minimum, three hundred cubic feet of good timber.

	£	s.	d.
Rent, at 1*s.* 6*d.* per acre, for thirty years	2	5	0
Cost of cultivation (after the first year the trees would need little or no care)	1	14	0
Felling, trimming, and rolling to river, average distance, two miles	4	0	0
Rafting to Quilon, average distance, forty miles	4	0	0
Interest on outlay, exclusive of last two items	3	15	0
	£15	14	0
Value of timber at Quilon, at present rates	45	0	0
Profit	£29	6	0

The Kulledyaur is navigable from Pattanapuram to Quilon during nine months in the year, and the upper part of the river available for timber, *down stream only*, during the subsidence of the freshets, five or six times during the monsoon.

Timber used formerly to be brought down from these very localities in the manner described, but the supply has become nearly exhausted, and no measures have been taken to provide for the future.

Valuable timber trees of other genera are found in immense variety on the Western Ghauts; many of them grow to an enormous size; the stem of the angeli-tree, for example, is frequently found seventy or eighty feet in height, straight as a line, and three feet in diameter at the upper end. This, and many other species, furnishes very good and useful timber, but the teak is so unquestionably the best wood for almost all purposes—combining in an unrivalled degree all the useful properties—strength, lightness, elasticity, and durability—that it is the only tree that need be specially recommended for cultivation.

CHAPTER IX.

BUILDINGS, PLANT, AND MACHINERY.

THE importance, in a sanitary point of view, of having a good, substantial, comfortable house, has already been mentioned, and fortunately, such a house can be constructed in most parts of Southern India at a tolerably cheap rate. The cost of one containing five or six good rooms, all on one floor, with walls of burnt brick, in mortar, called in India, pucka walls, and a tiled roof, will vary in different localities from 300*l.* to 500*l.* The floor should be raised three or four feet, or in damp situations, five or six feet above the ground; it is usually terraced, the floor itself being composed of brick on edge, covered with a coating of plaster; timber flooring on the ground floors is seldom used, in most localities it would add greatly to the expense, it is less durable, and more apt to harbour insects.

In feverish districts it is as well to go to a little more expense, and have your bedrooms on an upper story, as the malaria always lies low.

There should be a broad verandah all round the

house, and the rooms, especially the bedrooms, should be lofty and well ventilated,—nothing more conduces to health than a good, dry, airy bedroom. The style of building for India should be solid, the walls, for instance, of a house of the description aforesaid, not less than eighteen inches thick, and if with an upper story, additionally strengthened with pilasters in the lower one,—the formidable scale on which the operations of Nature are carried on in India, the deluges of rain, the occasional hurricanes, now and then, perhaps, an earthquake, render solidity of construction indispensable.

The foundations also require great care, and these are just what the native builders are most apt to neglect; not only do they stint them of their proper dimensions, but they usually put into them the worst materials and most slovenly work, under the idea that all will be covered up, and nobody a bit the wiser. They are also very careless as to the quality of the soil; many a house has come to grief by the subsidence, after heavy rain, of a portion of the earth on which it rested. When a firm base cannot be found at any reasonable depth, and there is no possibility of selecting a better site, the best arrangement is to build the foundation with footings, making it very broad at the base, and gradually diminishing in thickness up to the basement of the wall; this is practically found to give much greater stability than increased depth. The bottom of the trench in which the foundations are laid, must be carefully levelled and rammed, no loose earth allowed to remain, and a bed of concrete under the foundations

will be found a great improvement. It is really necessary to call attention to all these petty details, which might easily be overlooked by a man not accustomed to such work, for a farmer in India must usually be mainly dependent on himself—he will usually be out of the way of any professional assistance, except the native builders, who, as before said, are not over trustworthy.

The doors and windows of the house should be double, the inner ones glazed, the outer Venetianed. Sash-windows are hardly ever used in India, the objects being first to be able to get as much air as possible by opening the whole space at once for ventilation, and secondly that the windows should be able to close in such fashion as to offer the most effectual resistance to the pressure of the wind in gales, which blow sometimes with a violence unknown in temperate regions.

The force of an Indian hurricane has been known to equal a pressure of fifty pounds on the square foot; the external Venetianed windows opening outwards afford the utmost resistance possible: they must be smashed before they can be blown in.

The enormous volume of rain-fall sometimes discharged within a very brief space, during the monsoon, must also be borne in mind. The roof must be strong. If terraced, it must have plenty of spouts to carry off the water, and care must be taken that they do not get choked up with birds' nests.

If tiled, it should have a good slope, not less than thirty-three degrees.

The site should be well drained to prevent the water from lodging and undermining the foundations.

It will also be found the best economy to build substantial stores or granaries adequate to the requirements of the farm. Those constructed by the natives are usually of a description to be emphatically termed cheap and nasty—the walls of mud, or of unburnt brick, in clay, (called cutcha walls,)—the roofs thatched either with straw or palm-leaves.

The loss, however, by damp, rats, and insects, in these buildings is so great, and the necessity for repair so incessant, that this so-called economical system is really by far the most extravagant, to say nothing of the risk of fire.

All such buildings should have their walls of burnt brick in mortar; wherever white ants are prevalent all timber should be kyanized, or the basement and lower part of the walls for a yard above the ground built with mortar in which corrosive sublimate has been mingled.

In Burmah, where the natives are in the habit of elevating their buildings (those made of timber,) upon wooden posts several feet above the ground, it is customary in the first place to externally char that portion of the posts that is to be let into the ground, and then steep them in petroleum, or earth-oil previous to fixing them in their place, and this is found a great preservative against the ravages of white ants.

Corrugated iron roofs answer very well for stores and warehouses; they are, it is true, rather expensive, costing from 7*l.* to 8*l.* per hundred square feet, while

terraced roofs can generally be constructed for about 3*l*. 10*s*., and tiled roofs for 2*l*., for the same dimensions; but the iron is much the most durable, the driest, and the most free from vermin. Terraced roofs, unless very carefully constructed, which in places remote from large towns they are not likely to be, are very apt to crack and entail constant expense for repairs; I should, as a general rule, prefer the tiles, if I found I could not afford the iron.

It is common enough to hear complaints of the inefficiency of farming implements in India, and diatribes against the "pig-headed stupidity" of the native farmers, who "will not adopt our improved models." The little Indian plough furnishes a continual subject for a sneer. The branch of a tree made to do duty for a harrow, the "oxen that tread out the corn," the Mamootie or Indian mattock, a "spade turned the wrong way," the rough little low-wheeled carts, the primitive harness, &c., all are denounced in the lump as barbarous and absurd, without much consideration of the conditions under which they are used; and the story of the coolies, who, when compelled to use wheelbarrows, carried them on their heads as the most natural mode of employing them, is quoted as a proof of the obstinate adherence of the whole race to their ancient ways, and its invincible hostility to improvement!

Now this involves two great misconceptions. In the first place, the native methods, as actually used, are not by any means so despicable as they appear when described at a distance; they must be considered in

connection with the work to be done, the people who have to do it, and the natural conditions under which it must be performed. The native plough, for example, roughly hewn out of the branch of a mimosa or acacia tree, would certainly be a very indifferent implement in England; but, for the greater part of the work it has to do in India, it is about the best form possible, as well as the cheapest, both to make and to work. It would be like breaking a butterfly upon a wheel to employ an English plough to scratch a paddy-field when the earth is thoroughly wetted before it is ploughed, and where three inches deep is ample for a furrow.

In the second place, the natives, though pardonably backward in expending their money on doubtful investments, have no insuperable objection to improvements as such, when they have succeeded in understanding them and find them profitable.

The wheelbarrow is now used in quite orthodox fashion on most public works, and by many private (native) contractors and dealers; planks are laid down for them to run upon, pullies and slings arranged to hoist them to the surface from deep excavations, and this, not only under European superintendence, but very frequently by the natives themselves, from their own consciousness of the advantage gained.

The little low-wheeled cart, originally constructed to go across country without breaking to pieces, and well enough adapted for that purpose, has been generally superseded by carts of improved model, wherever decent roads have been made.

English carpenters' tools are coming into general use; at Dowlaishwaram, the pit-saw has been in use for years, "Europe fashion," in lieu of the old native plan of fixing the log to be cut nearly upright, and pulling a cross-cut saw backwards and forwards through it horizontally.

For sugar-cane plantations, the English plough, with extra broad share, has been introduced; windmills have been employed for raising water; and water-power used instead of bullocks for working the mills to crush canes for sugar and cocoa-nuts for oil.

It is true the progress has as yet been slow, and a man might even now travel through the greater part of the country without observing any alteration in the old native system. But still the beginning has been made; the first step, always the most difficult, has been taken, and unmistakeable evidence afforded that there are no insuperable obstacles to the improvement either of the resources or of the races of India.

The ordinary farming implements—spades, hoes, pickaxes, mattocks, billhooks, crowbars, &c.—can be procured in India manufactured in the country, quite good enough for all practical purposes, and much cheaper than the English articles. Tools, however, of a superior description or for finer work, carpenters' and smiths' tools, quarrying implements, and, of course, machinery of all sorts, should be imported from England, and from the best makers; goodness is the best cheapness in articles of such description.

Water-power can usually be commanded on an estate lying under the great Government irrigation works without extra charge, as the water which is generally taken for the fields may first pass under a breast-wheel; the difference of level will generally be sufficient for this. Steam-engines must generally be dependent on the jungles for fuel, no coal having as yet been discovered in Southern India, and the cost of sea-borne coal being much too great for general use.

Horizontal windmills have been used with good effect, especially for raising water.

Bullock-power is usually employed by the natives for work on a small scale; the cost of a pair of serviceable bullocks varies from 8*l.* to 14*l.*, and their keep, in hard-working order, would be about 1*l.* per month.

In all work on a large scale, mechanical appliances are always economical, the larger the work the greater the economy; but it must be remembered that machinery is not necessarily, in every case, a positive advantage as such. Its prime cost is high, its management expensive, and, unless its out-turn of work be so great as to distribute the said expense over a very large surface, the cost will break the back of the returns.

It is not unusual to find unpractical men labouring under an unrequited passion for machinery as such, and setting up steam-engines to mill the produce of some half-dozen acres, and priding themselves on an infinitesimal saving in labour, possibly equal to one-tenth of the annual depreciation of their de ad stock.

It is the estimated net profit on the whole transaction which must in each case decide the choice; and where the out-turn of work required is small, and labour cheap in the neighbourhood, it may often be found the best practical economy to adhere to the old native processes, barbarous though they may appear.

The rate of wages has risen very considerably within the last ten years, especially in the improved districts, and bids fair to increase still more. About five-and-twenty years ago the pay of a common unskilled labourer in many parts of Southern India was $1\frac{1}{8}$ pence a day—and the maximum nowhere exceeded three-pence, even at the Presidency. At present even in the least advanced districts the minimum wage for an adult male cooly is $2\frac{1}{4}$ pence, the average in the improved districts $3\frac{3}{4}$ pence, and during harvest-time, it often rises to sixpence per diem! Sawyers who used to get from seven to ten shillings a month, now receive from ten to fourteen, and make more still by the practice now coming into general use of working on petty contract at per scantling of timber and number of feet cut, this being as usual the most economical way, both for workman and employer.

Carpenters' wages vary according to skill from twelve to thirty shillings per month, and maistry carpenters or foremen, to forty or fifty shillings a month, and at the Presidency still higher. Smiths receive about the same rates; these refer to native workmen only, and are about

twenty-five per cent. higher than they were twenty years ago.

A list of average rates of wages as existing in the districts of the Madras Presidency may be useful,

	£	s.	d.		£	s.	d.
Bricklayer, maistry (foreman), per diem, from	0	0	9	to	0	1	0
" good workman " "	0	0	6	"	0	0	9
" common " "	0	0	4½	"	0	0	6
Carpenter or smith, maistry " "	0	1	4	"	0	2	0
" " good workman " "	0	0	9	"	0	1	0
" " common " "	0	0	6	"	0	0	9
Chuckler (worker in leather) " "	0	0	6	"	0	0	9
Agricultural labourer " "	0	0	3	"	0	0	6
" " woman " "	0	0	1½	"	0	0	2
" " boy " "	0	0	1⅛	"	0	0	1½
Woodar or navvy " "	0	0	4	"	0	0	6
" " woman " "	0	0	2¼	"	0	0	3
" " boy " "	0	0	1½	"	0	0	2
Gardener " "	0	0	4	"	0	0	6
Ordinary cooly or oddman " "	0	0	3	"	0	0	3¾
Bearer, per every ten miles "	0	0	4½	"	0	0	6
Head cooly (porter), do. "	0	0	3	"	0	0	5¼
Cart with two bullocks and driver, do. "	0	1	6	"	0	2	0
Carriage bullock, do. "	0	0	9	"	0	1	0
Boat coolies, to row, track, or work paddles, per man per mile "	0	0	0¼	"	0	0	0½
Lascars, to manage sailing boats, to steer, row, pitch tents, clear jungle, or make themselves generally useful, per month "	0	8	0	"	0	14	0
Peons, watchmen, or messengers, do. "	0	8	0	"	0	12	0
Gomastas, do. "	1	8	0	"	3	10	0
Writers or clerks, do. "	1	10	0	"	4	0	0
Overseers (European), do. "	10	0	0	"	30	0	0
" (East Indian or Portuguese), do. "	5	0	0	"	15	0	0

MATERIALS.

		£	s.	d.		£	s.	d.
Raw bricks, per 1000	from	0	1	3	to	0	2	0
Burnt do. (good), do.	,,	0	7	0	,,	0	14	0
Slaked lime, per para (= 4000 cubic inches)	,,	0	0	6	,,	0	2	0
Teak timber, per cubic foot	,,	0	2	2	,,	0	5	0
Country timber, of sorts, do.	,,	0	0	9	,,	0	1	6
,, iron, per lb.	,,	0	0	2	,,	0	0	3
,, nails, do.	,,	0	0	2¾	,,	0	0	6¾
Firewood, per cart load (700 lbs.)	,,	0	3	0	,,	0	10	0
Burnt brick and mortar masonry, by contract, per cubic foot	,,	0	0	3	,,	0	0	4½
Tiled roof, per 100 square feet	,,	1	12	0	,,	2	4	0
Thatched do., do.	,,	0	10	0	,,	0	14	0
Rough stone, without mortar, per cubic yard	,,	0	2	3	,,	0	4	0

CHAPTER X.

LIVE STOCK.

The condition of the live stock has, until quite recently, been, almost everywhere, a standing opprobrium against the native farmer; the horned cattle, small and weakly, the bones too plainly visible through the skin during the greater part of the year, the animals not only neglected and half-starved, but often treated with downright cruelty, for the superstition that forbade their slaughter made unfortunately no stipulation for their being kindly treated; consequently the supply of milk, though good in quality, was always very scanty; the beef, when required for European comsumption, poor, tough, tasteless, and devoid of fat; the animals employed for burden, draught, or ploughing, deficient both in strength and endurance, and the ratio of mortality by disease very high.

The usual penny-saving economy of the Hindoo grudged the expense of breeding cattle carefully, and of feeding and tending them properly: he thought it cheaper to work them to death, and then buy new ones, and truly cattle were very cheap in those days.

I have seen both cows and draught bullocks bought at from fifteen to twenty shillings a piece, less than one-fourth of what they would cost now. The Hindoo did not feel sure that better training would make better animals—what they always had been they always must be—thus they were created, thus it was *their caste* to remain. He was not absolutely blind to the fact that additional power would do additional work, for he would at any time pay higher for a strong bullock than a weak one, but he did not believe in the possibility of improving stock, and the consequence was that the stock kept degenerating from bad to worse, and people, even Englishmen, got it into their heads that Indian cattle were inevitably bad, that there was "something in the climate" hostile to all improvement. Yet even in those days, the experience attainable in India itself might show that with better food a better stock was attainable.

The Mysore cattle, and the so-called Nellore breed, the natural habitat of which was in the talooks between the Kistna and Manéroo rivers, were manifestly superior to the general run, the simple explanation being that they got more to eat. Moreover, where English gentletlemen, impatient of the infamous meat they could obtain in the bazaars, took to keeping their own stock—feeding and tending the animals in a rational manner—providing them with hay against the dry season, when the poor native cattle were wandering about the jungle eating roots and twigs, and wandering miles for just enough to keep life in them—where they provided water-meadows to secure a good stock of grass, and even went

the length of administering gram and cholum in their zeal for a good sirloin,—it was found that the meat was most marvellously improved, so much so that it was sometimes considered "too rich" by very old Indians! Yet even these examples were insufficient to induce the native farmers to turn their attention to the improvement of live stock; perhaps their religious prejudices may have made them revolt against the idea of cultivating beef for the European maw; perhaps the immediate outlay influenced them more than the prospective return. At any rate it was not until the Government had established periodical cattle-shows and offered prizes for the best cattle, that anything was really done in the way of improvement.

Even then the progress at first was but slow. The suspicious temper of the native imagined some sinister motives must exist for what they thought such unaccountable liberality. Government, however, persevered, in spite of discouragement, and at last the influence of hard cash was manifest, and unmistakable improvement visible in the stock paraded at the Exhibitions. Of course the greatest difference was visible in the young cattle—calves, yearlings, and two-year olds—which had had the benefit of the new system from their birth; but even in the full-grown cattle great amelioration could be be perceived. Some of the draught bullocks exhibited at the cattle-show held at Addunky in 1863, were fully equal to the best of the Government cattle that were trained at great expense for the service of the Foot Artillery. Not, be it explained, for the artillerymen to

eat, but to draw the artillery guns, which until quite lately were for the most part *horsed* by bullocks.

A very handsome young bull, nearly full-grown, at the same cattle-show, which, in its stately grace, vividly recalled to the minds of the spectators the ideal bull of the Assyrian sculptures, measured as follows :—

	Inches.
Height to top of hump	64
„ back behind hump	55¼
„ above haunch	59
Length—Shoulder to rump	64
Girth	82

The cows exhibited on the same occasion, though not showing as great an improvement as might have been wished, were still very far in advance of the average animals of a few years before. The prices were a very satisfactory proof of this fact. 16*l*. and 18*l*. per pair was offered for draught bullocks, and 6*l*. and 8*l*. for the best cows. It is not very long since 3*l*. to 4*l*. was considered a very high price.

Cattle should always be sheltered at night, and whether you want to get work, beef or milk, out of them, carefully fed. Of course, during the dry season, when the natural pastures are almost worthless from aridity, an artificial supply must be provided; but during the wet season also, they must be provided with straw. The natural pasture is then too rank to serve as the sole, or even principal, article of diet. They should also have a feed of grain once or twice a day, two moderate meals being better than one large one. Gram is the best for

draught bullocks or for beef. If Madras gram (coolty) is used, it should be boiled as for horses; if the Chenna or Bengal gram be preferred, it is sufficient to steep it in cold water,—a little salt with the gram is beneficial.

If milk is the main object, the best food for cows is cholum (Indian corn), boiled and mingled with bran. A good Nellore cow, in full milk, yields on the average five quarts a day.

A very considerable improvement has lately taken place in draught bullocks. Those which bring down cotton from the Cuddapah district are very superior animals; they are worth 14*l.* the pair, and can draw half-a-ton in lieu of the old conventional load of 700 lbs. The credit of this improvement is solely due to the native traders, and it is an illustration of what may be done, and done still more effectually, when more capital and higher intelligence are employed upon the task. There is, I think, no room to doubt but that all breeds of Indian cattle, from the large and lazy Bramin bull to the small zebu (excellent for beef)—from the powerful Mysorean to the little Travancore cow, less in size than a donkey, and as active as a goat—are capable of indefinite improvement if properly cared for.

Buffaloes scarcely deserve notice. The natives breed them for milk, and for ploughing marshy lands, and they are sometimes used for draught; but although possessed of great strength, are so slow, obstinate, and lazy, as to be of very little use. Their beef is very coarse and bad, and there is among Europeans a strong prejudice against their milk. They are, however, more

hardy than any other horned cattle, and can stand any amount of wet and exposure.

Sheep vary very much in India. On the western coast they do not thrive at all; on the eastern coast they are small and lean; the wool scanty, short, and wiry; some breeds as hairy as goats. The best specimens are found in the inland districts, especially in Mysore and Coimbatore. The sheep of the latter district are the finest in Southern India.

With these animals also everything depends on the training. What is called ordinary bazar mutton is small, lean, hard, tough, and tasteless; but I have eaten grain-fed mutton nearly equal to the best Southdown. It is a very common custom among such of the gentry as can afford it, to keep their own sheep, feeding them up for the table; and the difference of the meat so produced is marvellous, not only in flavour, but in size.

The leg of a common bazar sheep seldom exceeds five pounds in weight; in Travancore is usually between three and four; while the leg of a Mysore or Coimbatore sheep, grain-fed, will weigh as much as eight or even nine pounds.

Considerable improvement also has taken place of late years in the mutton provided for sale at large stations, where the demand is considerable, and where, in consequence, the dealers can depend upon a sale at fair prices. Of course the said prices have greatly risen. I remember in 1838 buying sheep in the Dharwar district at a shilling a head, and for some years later the average market rate for an ordinary sheep in the whole

of Southern India, did not exceed eighteen-pence. You would now pay three or four shillings for an ordinary sheep in most places, and eight or even ten for what is called a "first sort." Taking, however, the mutton at per pound, the cost of the good is not much heavier than the inferior.

The Government Exhibitions have also had some effect on the improvement of sheep. Individual natives have been encouraged to compete. A flock of wethers fed by the Grama Munsif of Paikéru was shown at the Rajahmundry Exhibition of 1858-59, and the mutton was both larger and finer than any seen in the district before. I am informed that other natives in the neighbourhood have since followed the good example and have found no reason to regret their boldness.

If adequate care be devoted to the breeding as well as feeding, there is I think every reason to believe that an excellent stock can be ensured, and in the daily increasing demand for good meat in India and the growing tendency towards a more European style of living, a guarantee may be found that capital so expended would not be money thrown away.

Owing to the demand occasioned by the exigencies of the cavalry and artillery services, and the higher prices cheerfully paid by the upper classes for anything conducing to luxury and show, much more care and attention has been bestowed upon the horse than upon any other animal in India. A tolerably regular supply of Arabs is annually imported, landed on the Western coast and thence distributed over the country. Horses

have also been brought from the Cape of Good Hope, and of late years from Australia; the latter supply bids fair to increase rapidly, and the "Walers," as they are called, are much in request: they surpass the country-bred horse in size and strength, and appear to stand the climate very well. The imported English horse is usually considered unsuited for hard work in India, he feels the heat too much; but some of the finest and fastest animals on the records of the Indian turf have been out of English mares by Arab sires.

The Persian and Toorkee horses are rather admired by the natives, but not in high favour among Europeans. The Cabulee Yaboo is a sturdy, hardy animal, seldom exceeding thirteen hands in height and with large barrel, deficient in speed, but of great endurance, and a capital roadster for work.

The price of horses varies so greatly with the demand, and in different localities, that it is difficult to give any definite account of it. The following may, however, be accepted as tolerably fair averages:

Mahratta ponies, hardy, active, and somewhat vicious, from 2*l.* to 5*l.*; a better class of pony, up to 10*l.*; good Pegu ponies, 30*l.* to 50*l.*; a serviceable hack, 25*l.* to 40*l.*; a good horse, either for saddle or harness, or suited for a charger, quite equal to the requirements of any moderate man, from 50*l.* to 70*l.*; imported Arabs, from 50*l.* to 100*l.*; Australians, from 60*l.* to 80*l.*; fancy horses, at fancy prices as usual; cart horses may be said not to exist in India.

Pigs appear to thrive only on the hills; there are, it is

true, plenty of them in the low country, where in many places they perform the part of village scavengers, and of course are never eaten by any one with a proper respect for his stomach. Even when taken under European protection and carefully tended, the meat is very inferior. Even upon the Neilgherries they have not yet been brought up to the English mark, and the hams and bacon prepared there are quite of a second-rate description. An actual improvement has, however, taken place, and there is no reason to conclude that it has yet reached its limits.

Poultry of all sorts is plentiful in India and very cheap still, though double the price it bore twenty years ago. Fowls were then three half-pence and chickens a penny a-piece. At present, even in secluded villages, twice that amount would be charged for them. As first purchased, however, they make very poor food,—skinny, stringy, and with an unsavoury variety of queer flavours derived from the peculiarities of their food. If, however, they are bought as chickens, well fed and properly taken care of, they may be made nearly (it would be heresy to say quite) equal to the best Dorkings, and including all expenses will not average more than nine-pence a-piece. The same rules apply to all other descriptions of poultry.

Thus it may be fairly said that the whole and sole cause of the inferiority of Indian meat and Indian live stock, may be traced to starvation and neglect; and that with proper care and liberal treatment, the improvement already commenced may be carried on to perfection.

CHAPTER XI.

FARM SERVANTS.

THERE is at present a great scarcity of good subordinates in Southern India. Discharged soldiers, runaway sailors, and nondescripts, form the majority of the Europeans available for foremen or overseers, and there is no mincing the matter, that as a general rule they are an unsatisfactory lot.

A *really* intelligent, sober, and trustworthy European overseer would be cheap at 400*l*. a year on any large plantation. As it is, however, East Indians and Portuguese are often preferred; or, where the planter is himself well conversant with the vernacular and the habits of the people, natives of unmixed breed. Indeed, whereever there *is* such a thorough mutual understanding between the parties, I believe that the Hindoo proper is really the best and most efficient subordinate that can be expected in the present state of the labour market.

It is, however, much to be wished that a better class of young Englishmen should be introduced into the country in the subordinate grades. It is not for want of

inducement that they do not immigrate. They may expect salaries ranging from 10*l.* to 30*l.* per month, houses to live in, rent-free, a better status, and pleasanter work than they could enjoy as mechanics in England.

A respectable and trustworthy European *once known*, is certain of always finding good employment in India. The difficulty of course is to *become* known; also the distance and expense of the journey doubtless deter many young men of the class most likely to succeed from turning their attention to such a mode of life, unless previously *guaranteed* a good situation.

Of course the difficulties *may* be overcome. A young man *might* find his way, say to the Wynaad, for example, with testimonials in his pocket from well-known persons—from the clergyman of his parish, or from parties in England having Indian connections.

Planters and men occupying influential situations in India, engineers in charge of works, and so forth, must have some relations at home; there must be some young men in the parishes where those relations reside who would be glad enough to take service in India under the conditions mentioned above. It would be worth the while of the young man or his family to raise the sum requisite to give him such a start. 100*l.* would be sufficient, with ordinary economy, both for passage and outfit, as far as Madras, Bombay, or Cochin, while from the date of his landing in India, his expenses should be paid by his employer.

Surely it would be worth the while also of the planters, who are incessantly grumbling at the inefficiency and

worthlessness of their subordinates, to take a little trouble, and even go to a little expense, to import young men of decent training, who come, as the Scotch say, of kenned folk; who possess respectable relatives to be shamed by their misconduct. Surely such young men would be preferable in all respects to anything now procurable (as a general rule) in Southern India. They would speedily acquire the necessary knowledge of the language, easily picked up in youth, and would be able to comprehend the character of the natives far better than the discharged soldiers can do, whose experience has been limited to the barracks and bazars of large stations, where native life is seen in its worst, its ugliest, and its least characteristic form. Men whose first years in the country have been so spent, are found, as a rule, incompetent to understand natives, usually unfriendly towards them, and often disposed to be tyrannical over them. They have been prejudiced against them by that early association with their very worst orders; and their minds have seldom been sufficiently cultivated to be able to adopt liberal and enlightened views contrary to what they fancy to have been the teaching of their own experience. They thus enter upon their new duties at great disadvantage. The natives, who are extremely sensitive and wonderfully quick in reading character, are at no loss to recognize the feelings of such Europeans towards themselves; they also regard them as contaminated by their former associations. Respectable natives, especially of the agricultural class, look down upon camp-followers as the very scum of the earth, and it is proverbial to ask

whether any good can come out of a cantonment bazar. For these reasons, even without any fault of his own, the ex-militaire is often thrown into a hopeless position, every decent native shrinking from him, while he is sought out by the worst and vilest, who call him "My Lord," flatter his vanity, pander to his passions, and make him the tool of their own roguery.

Several exceptions, indeed, I have known,—men who in spite of temptation, and very severe temptation, and of difficulties all but insuperable, have maintained their integrity. Their names recur to me as I write, and their example is invaluable, both as redeeming the class to which they belonged, from universal dislike and contempt among the natives; and as illustrating the value of a really good European subordinate to his employer. Sober and trustworthy, zealous in the discharge of their duties, actively interested in their work, encouraged by success and stimulated to further exertion by failure—both just and kind to the natives under them, having no favourites, allowing no dereliction of duty, taking no presents, listening to no flattery—these men deserved and obtained the full confidence and esteem of their employers, secured for themselves a comfortable living, and in several instances have risen to the rank of gentlemen.

There are a great many native Portuguese on the western coast of India, who make capital writers and accountants, and very decent servants in general; they usually speak and understand English well, are usually sober, and require much lower wages than Europeans.

That have not that influence over the native mind which a *good* English overseer possesses, but are certainly far preferable to a *bad* one.

I cannot recommend the Mahomedans of India as being, as a class, well qualified for employment upon plantations. Their natural bent seldom takes an agricultural turn, except sometimes for ornamental gardening. They are apt to bully the coolies, who both fear and dislike them, and they are much more addicted to dissipation and extravagance than the corresponding classes either of Hindoos or Portuguese.

Hindoos, as has been already observed, make excellent servants, provided you understand them, and they you; and they are, I believe, if fairly paid, well treated, and not thrown into unnecessary temptation by the carelessness of their master, much more honest than it has been the fashion to suppose.

They have, it is true, a habit of taking what they call "dustoory," that is, a per-centage out of payments or purchases which they are entrusted to make, and of receiving presents from the people employed by their masters. The same fashions, under the names of commission, fees, vails, or perquisites, are common enough in England, and often not so moderate.

In India it is an understood thing, and so long as confined within its normal limits, is no fraud upon either purchaser or seller, employer or employé; it is simply an element of price, and a means of remunerating labour, originating, doubtless, in irregularity or insufficiency of wages. It may be, and often is, abolished by

mutual agreement, the change being considered in the salary.

As to general correctness and accuracy of accounts, my own experience leads me to speak well of the Hindoo subordinates. Scamp work and fictitious measurements will, of course, be found occasionally, where due supervision is not exercised; but I have certainly not found the Hindoos worse than other classes of subordinates in these particulars. His timidity will generally keep the Hindoo honest, where there is much chance of being found out.

Brahmins make capital accountants, and often are very good overseers, but it must be an understood thing beforehand that caste must never be made an excuse for the neglect of *any* duty.

Men of the lower castes have generally more physical energy, and make no difficulties about doing whatever they are told; they are, however, not so sober as the higher caste men.

A general fault in India is the employment of an unnecessary number of servants. There is a strong tendency to make places for men instead of only selecting men for places. It is of course a relic of the old semi-barbarous style of life, when serfdom was the rule, and when every man who could afford it, surrounded himself with a number of retainers, partly for his personal safety and partly for the sake of ostentation; and when the lower ranks were glad enough to attach themselves to their superiors for protection, or as expectants, (ooméedwars) without any salary or definite employ, but

for the hope of something in future, and in the interim for the benefit of the crumbs that fell from the rich man's table, or such odds and ends as they might be able to pick up.

Under the old native system, even servants who had definite employ were at very low nominal wages, were almost always in arrears, and often never got paid at all. Their profits arose chiefly from "perquisites," a word of remarkably extensive signification.

It was of course their interest to reduce the tale of work as low as possible, to introduce as many of their own relations as they could into minor offices constituted for the occasion, where they might "eat a piece of bread."

The proprietors seldom possessed any talent for organization, had never heard of "units of work," or "economy of power," could neither calculate what was needed, nor arrange how to supply it. Their education had usually been of the very worst description, calculated only to foster idleness, self-indulgence, and every softer vice, to make them incapable of any comprehensive superintendence of their own interests, to predispose them to look upon everything like work with horror and dismay, and to believe human nature capable of doing but very little of it, indeed.

These, I believe, were the original causes of the old Indian (or I might say Oriental) system of economics, if such words as economics and system can possibly be applied to ways of procedure so devoid of plan and forethought. We, the English in India, found the said

"system" in full force, and at first starting, of course adopted it. As a feeble minority we could in those days have hardly done otherwise. We ought, however, to have kept constantly in view the duty of eventual reform, and to have taken every opportunity to modify or get rid of customs so irreconcileable with improvement and prosperity; something in the right direction has indeed been done, much more in Southern India than in the Bengal Presidency, but still the "Oriental system" remains the greatest hindrance to doing anything at once successfully and economically.

There is in the present day no real necessity for adhering to this "system," for persevering in the good old rule of employing half-a-dozen men to do the work of one. The natives of Southern India are becoming, to a much greater extent than could have been expected, *Europeanized* in their ideas of work. So many of them of late years have been trained from their very childhood upon the large public works that have been in progress, thus becoming accustomed to and appreciative of the maxim of working with one's might, that they have to a great measure leavened the whole mass. One man decently paid will now-a-days undertake and do fair justice to a charge which, within my own memory, would have been considered as affording work enough for four or five.

Planters often waste money in paying for work which they would or should do much better themselves,—namely, supervision. For any farm not exceeding 500 acres, an active man can easily be his own manager

and overseer. I have known it done on larger estates. Petty superintendence can be entrusted to native overlookers or gomastas, and under a sharp master's eye will be done well. On larger estates, or where complicated machinery is employed, a good English overseer will be necessary, as also in cases where the master cannot be permanently resident.

It is impossible to lay down rules for every case. It will be sufficient if the principle is steadily borne in mind not to employ more cats than catch mice,—to be on one's guard against the usual Indian tendency to multiply the number of hangers-on,—and to remember that in India, as in every other country, it is indispensable that a man look well after his own business, if he wishes to thrive.

CHAPTER XII.

CONCLUSION.

THE foregoing observations will, I trust, be considered as affording sufficient ground for the conclusion that Southern India, as a field for farming operations, conducted by Europeans, offers at any rate a fair prospect of success; that its difficulties and drawbacks have been much exaggerated, and its advantages, if not always under-rated, at all events misunderstood; that the general conditions for prosperity or failure are much the same there as anywhere else; that there are no difficulties peculiar to the country that cannot be overcome; and that the internal improvements, now in progress all over the country, have a direct tendency to remove them.

The importance of opening out new fields to enterprise needs no comment. It only remains to compare those afforded by Southern India with those available in other colonies, and here a distinction must be drawn.

It must be admitted at once that for European *physical* labour, and especially unskilled labour, such, for instance, as that of the Irish peasants who emigrate in

such numbers to America, Southern India affords a field less suitable, not only than America, but than any extra-tropical colony. Not only is the climate hostile to such labour, except during a brief season of the year, or for but a few hours in the day, but the competition of native labour is an insuperable difficulty; the difference in the out-turn of work between a well-fed and well-supervised native cooly and an Englishman is not sufficiently great to neutralize the difference between their wages, even supposing the Englishman able to work up to full pressure in the country. European unskilled labour will not pay in India, and there is, therefore, no demand for it.

But in the higher branches of skilled labour the case is very different; there, the European not only fairly earns his superior wages, but he is always competent to do much work of descriptions which the natives as yet cannot even attempt. Skilled labour is also, for the most part, carried on under shelter, requires less muscular exertion, is, in short, less liable to be affected by the alleged enfeebling influences of climate.

Brain labour is the most in demand of all, secures the highest remuneration, achieves the noblest results, and the field for its exercise appears likely to increase rather than diminish for many a long year to come.

For capitalists, India offers many advantages: the variety of its productions, and the high specific value of some of them; the fertility of the soil, exuberant wherever water can be obtained; the comparative cheapness of labour, and the general high profits to be attained.

It is upon equal terms with Australia with regard to distance from England for transport of goods, and has the advantage of quicker communication by letter, telegraph, or for personal travelling.

The cost of living and of travelling within the country is cheap in India, as compared with the Cape or with North America, except on the lines of the railroads.

The only real drawback is the climate; the evils of which have been shown to be much less than usually supposed, to be in a great measure dependent upon locality, and remediable by care. Southern India has many varieties of climate: many parts of the country are as healthy as the best of the South of Europe. It is, doubtless, perfectly true that pestiferous districts do exist. Soldiers, who in the course of duty have to go everywhere, have sufficiently tested their evil effects, and the result has given a bad character to the country at large. But people, who have the luck to be at liberty to select their own stations, will have no difficulty in finding suitable ones in Southern India healthy enough for any ordinary European constitution.

The recent lamented mortality among governors and members of Council, has, I believe, tended somewhat to strengthen the old prejudices against the Indian climate, but surely without reason. Those whose loss we deplore were mostly men past the prime of life, some verging upon years at which mortality could not be deemed premature in any region. Many of them

had been middle-aged men before they ever set foot in India; some of them had suffered under the pressure of the most awful anxiety and responsibility possible to conceive, and the intensest and most incessant head-work ever known. Some were victims of chronic diseases, contracted long before they ever were employed in the East. So many deaths, within so brief a space, of men who were, or had been, serving their country in India, may truly appear a curious coincidence; but, when examined into, can hardly be considered to offer any valid grounds even for the condemnation of Calcutta, certainly none whatever for denouncing British India in general.

The political benefits to be derived from British colonization in India may excuse the addition of a few more words.

The direct advantages of having the table-lands and plateaus of the hills occupied by colonies of sturdy farmers, who, with their overseers and other dependents, would be capable of organization as rifle volunteers should need arrive, is self-evident.

In the lower country, the farmers would be probably more isolated, less efficient as a reserve of physical force, but, perhaps, likely to be more serviceable still by their moral effect upon the natives. Thus it should arise.

Wherever independent Englishmen settle, a public opinion springs up, abuses are detected, reform called for, and at length attained, wants are discovered, improvements proposed, urged, insisted on, and, finally,

achieved; the district becomes flourishing, not only the Englishmen themselves, but (which I believe to be a rule without an exception) the natives also in their neighbourhood increase in wealth.

This will be found intelligible enough when it is remembered that in India when the people are badly off, it is very rarely from any fault or parsimony of nature, but simply from want of means of developement, from want of intelligence to devise, and of energy to use such means.

The native in his normal state considers roads, bridges, drainages, &c. the business of Government, but in no way his own. If they are good, he rejoices and uses them; if they are bad, he thinks it is his fate; he seldom ventures even to mention the circumstances, —who is he that his word should be taken?

But an Englishman comes into the place, immediately begins to grumble, and seldom leaves off "bothering" the authorities till he has got some improvement effected, by which of course both he and the natives benefit alike.

Then the Englishman drains his land, manures it properly, introduces machinery and capital, the natives look on at first in fear and trembling, then in admiration when the thing succeeds; they imitate the improvements as far as they can, and some of the capital necessarily finds its way into their pockets.

Then, also, the natives have a great notion of making a referee of any respectable European in their neighbourhood, in cases of dispute among themselves: they

put far more confidence in him than they do in one another; they have an instinctive feeling that he is hostile to anything like official oppression or jobbery, and that the petty native authorities find their powers of bullying considerably restricted by his presence. Moreover, the European is usually regarded as a bit of a doctor, and as a friend to the poor, a character which is, I am proud to say, well deserved by the majority. For these reasons, when an Englishman has been settled for a few years in a district, he is usually both respected and liked.

Now a feeling of loyalty towards British rule is naturally fostered, both by personal attachment to British men, and by a sense of improved personal prosperity under British auspices, and this is not merely a plausible hypothesis, but established as a truth by facts.

The Mahomedan merchants of Alleppy and Cochin rejected with contempt the overtures made to them by the rebels of Northern India, in 1857. The natives of the improved districts of the Madras Presidency were not only obedient, but loyal, during the period of the mutinies; they sent up voluntary addresses to Government, and in many cases volunteered assistance in case of invasion. I believe I may safely say, that with the exception of the Bengal Sepoys (for which exception a special reason can be given), no class which we had benefited, raised (*as a class*) a hand against us.

The rebellion, as far as it was a rebellion, was limited to the less improved and less Europeanized districts,

and mainly confined to the impoverished classes. By impoverished I do not mean the poor as such, still less the labourers or "lower orders," in the conventional sense of the term; but those classes which had been impoverished as classes by our agency, those whose previous status, influence, means of acquiring power and wealth, had been impaired by British supremacy: the native gentry of the old half-feudal half-patriarchal régime, the barons limited in their power to oppress, the younger sons deprived of their chances as military adventurers, the once privileged castes deprived of their former monopoly of office; these were the classes which having, thanks to our folly, obtained almost exclusive possession of the Bengal native army, did truly originate the rebellion.

A rebellion which had been long in contemplation, with which greased cartridges and missionaries had nothing to do, save to serve as a cry for the moment: a perfectly natural and consistent rebellion, which must have taken place sooner or later, and which only wants a good opportunity to occur again; a rebellion, in short, of the deposed power against the dominant one, a struggle for resurrection of a suppressed barbarism against the civilization by which it had been overthrown.

It is only referred to in this place as an illustration of our real strength and weakness in India. It shows, I think, that it is our best policy (not only for reasons of revenue) to encourage the growth of a middle class sufficiently wealthy and intelligent to possess influence

and self-confidence, and owing its aggrandizement solely to industry and the arts of peace. Such a class has as yet never existed in the East; the occasional local prosperity of a few merchants, here and there under special protection, being rather a proof than an exception to the rule. Under Oriental systems of government indeed, its existence was impossible. Soldiers and officials, or priests, were the only classes that could be influential there,—the great mass of the people were mere cyphers, and from long habit had come to recognize their position as such, as inevitable, they took no interest in politics, they submitted to whatever power came uppermost. If the amount of oppression under which they laboured, were a little more or a little less than the average, they set it down to their bad or good fate, but never dreamed of interfering to change it. Plenty of revolutions may be found in Oriental history, that originated with a cabal of nobles, or with the priests, or with a successful captain, or that were brought about by a woman, an eunuch, a barber or a durwesh, but I do not recollect a single instance since the secession under Rehoboam, where an Oriential revolution has been really the expression of public opinion, or brought about by the will and agency of the great body of the people.

It is only within the last few years that anything resembling an intelligent middle class has existed in India, and it has been entirely the growth of our own institutions and the education we have introduced; it is still in the weakness of infancy, and were our protection

withdrawn, would cease to exist as entirely as if it never had been, but such as it is, it has an opinion. The industrious classes are, as a body, in favour of British rule, and have no desire to return to the ancient régime; above all, they would deprecate with horror any revival of Mahomedan supremacy. They, the traders and farmers, quite realize the fact, that as a class they are prospering and making money, and enjoying protection for person and property to an extent never known before, and they are naturally conservative of the system under which they enjoy such advantages. Here and there an educated native may indulge in enthusiastic visions of a potential future nationality, may cherish the idea of "India for the Hindoos," but even then his notions of his wished for native government are modified by European views, and are as different from the old Orientalism as light is from darkness. He contemplates a system substantially like our own, only under native heads instead of Europeans, and if at any future period the majority of the people of India shall have become so far enlightened as to render such a result possible, the right of self-government would be ceded to them as to the people of Australia or any other colony, and ours will have been the glorious task of training an immense nation to honourable independence.

For the work has been commenced, the seed is being sown: the education we have introduced, the just laws we have established, the wise operations we have undertaken for the physical improvement of the country, all tend towards the creation and development of that

wealthy and powerful middle class, which must form the basis of all steady prosperity, and of all constitutional self-government. And this middle class will be both accelerated in development, improved in quality, and conciliated in sympathy by the presence of a large number of respectable non-official Englishmen, resident in the country, and as interested in its progress as the natives themselves. Such an element must largely avail to leaven the mass, to teach improvement by example, to encourage enterprise and self-dependence, and to disseminate Western ideas broad-cast through the land.

THE END.

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